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THE ENGINEERING AND MINING JOURNAL

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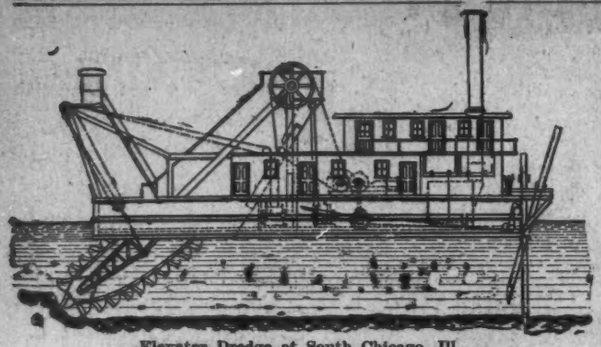

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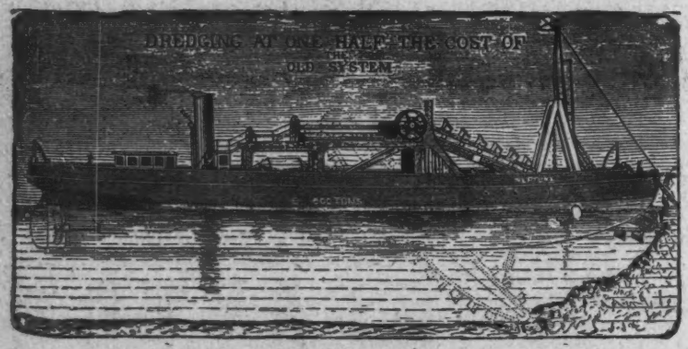

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THE Dakota tin interests have had their hearing before the Ways and Means Committee, represented by Mr. Untermeyer, of the Harney Peak Tin Mining Company, and Senator Moody, of South Dakota. It is rather strange that the latter should be the advocate of the imposition of a duty on tin for the benefit of foreigners, as the most prominent feature brought out by him with regard to the capital invested in the infant industry requiring protection and fostering care was that Englishmen had invested $1,500,000 in the enterprise. According to the statement of Mr. Untermeyer, however, the Ways and Means Committee and the House need not be in any hurry in taking action on the subject, as the company is willing that the duty should not be levied until it has demonstrated its ability to produce all the tin needed to supply the demand of the United States.

UNDER date of February 5th, the well-known London correspondent of the New York *Times* cables that within the last few days he has received information from four independent sources confirming the original statement in his dispatches that four millions sterling of one-pound silver notes have been or are being printed. These do not follow Mr WINDOM'S idea of being based on bullion, but rest on the more intelligible foundation of minted coin. The Government will make a seignorage of nearly 35 per cent., certainly amounting to over a million sterling.

The prevailing impression is that Mr. GOSCHEN will utilize these notes to call in the present large stock of underweight sovereigns with which the banks are now incumbered. His former experiment of recalling light half sovereigns was very successful, and it is assumed that he will repeat it now, in order to placate the bankers, who, so far as they have been sounded, are disposed to be hostile to the idea of one-pound notes.

IN a dispatch recently received from Laredo, Texas, it is announced that the second of two smelters has just been completed for the Mexican and Yguana Mining and Smelting Company, at Villaldama, in the State of Nuevo Leon. This transfer of the smelting industry from the United States to Mexico is what we predicted would occur when the Treasury circular of July last was issued, by which the application of the existing law was arbitrarily regulated so as to prevent the admission of these Nuevo Leon ores into the United States for treatment. The bullion now produced will be shipped to Liverpool to be refined in England, and the smelting and refining industries in the United States, as well as our miners of dry ores, will be injured for the benefit of Mexicans and Englishmen.

It may be interesting to record that the heads of at least two of our great lead smelting concerns (Republicans at that) had made arrangements to build smelters in Mexico had Secretary Windom reversed the ruling of his predecessors and shut out Mexican fluxing ores entirely. As it is, the arbitrary "instructions" which have hampered this trade, and the fear (groundless, we believe) that Mexican silver-lead ores will be excluded, have given quite an impetus to the development of the Mexican smelting business, and the "patriotism" of those few lead mine owners and smelters who would make money by excluding Mexican ores has already diverted a profitable trade from our American works—a trade that would be of substantial benefit to a very large part of our people—and it has laid the foundation for a rival industry that in the future will injure us still more.

The "patriotism" that has for its object the benefit of the few at the expense of the many, the making of the rich richer and the poor poorer, is a kind that our free Americans are not likely to indorse very long, and the politicians who care only for what affects votes are likely to see this before long.

The testimony of Mr. RITCHIE, of Ohio, quoted on another page, shows some of the beauties of this "protection against the development of our American metallurgical industry," as we may designate this short-sighted policy.

METALLURGICAL PROGRESS IN 1889.

Metallurgy has progressed during the past year in this country, mainly in the direction of the production of aluminum and its alloys with iron, steel, and the other metals. InEurope the progress has not been so marked in connection with this metal, but important developments have taken place in the ferro-nickel and nickel steel alloys.

The most important step forward with regard to the improvement in the production of aluminum has resulted in the reduction of the price of pure aluminum by the Pittsburg Reduction Company to $2 a pound, with a corresponding reduction of price in the various alloys of iron, steel, and copper. Mr. KEEP has contributed another valuable paper, published in the ENGINEERING AND MINING JOURNAL, January 25th of this year, in continuation of his former one (ENGINEERING AND MINING JOURNAL, August 18th, 1888), on the influence of aluminum on cast iron, which will be of great service as recording the positive results attained by an exhaustive series of experiments.

The experiments undertaken to test the properties of nickel steel by Mr. JAMES RILEY, of the Steel Company of Scotland, at the request of the Council of the Iron and Steel Institute of Great Britain, we have already referred to at length editorially in our issue of October 26th, 1889, and the results then reported by Mr. RILEY have been fully confirmed since. On the 17th January Mr. RILEY delivered the Watt Anniversary Lecture, at Greenock, Scotland, and in speaking of the advance in boiler-making by the use of steel, he said: "In nickel-steel you have the means placed in your hands of nearly doubling your pressures without increasing the weight or dimensions of your boilers. The possibilities which are here presented to the engineer I leave you to imagine." Mr. RILEY went on to say that already the probability of the introduction of nickel steel into the industrial arts had created such a stir among owners of nickel ore deposits, that he anticipated that the supplies of the metal would soon be so much increased that it would be possible to supply nickel steel at reasonable prices, and that the Steel Company of Scotland was already prepared to supply it.

There is one other metallurgical process which has been further improved during the past year, though the result of years of work and experiment, the Bartlett process for the treatment of complex zinc ores by smelting, which promises a practical solution of the question as to how to utilize the abundance of low grade argentiferous zinc-lead ores in this country, which have hitherto been practically valueless. A paper on this subject, by Mr. BARTLETT, was published in the JOURNAL August 3d, 1889. We consider the progress in this branch of metallurgy as worthy of note, for the process is no longer in the region of theory, but is being carried out every day at Portland, Me., on a practical and profitable scale

The usual number of claims for new gold and silver amalgamating processes, electric and otherwise, have been put forward, but we cannot record anything practical in the way of improvement in this direction.

The record put forward by the London *Mining Journal*, as to the metallurgical achievements of the past year in England, makes one realize the Rip Van Winkle condition of mining matters on the other side of the Atlantic, and leaves no cause for wonder that English mining engineers in India and other parts of the world prefer the ENGINEERING AND MINING JOURNAL to the leading periodical in London devoted to mining interests, as was stated in our columns last week by one of our subscribers in India. As an example of what we refer to, it is stated that a certain firm "built for the Transvaal a very powerful gold mining plant, the mill having six heads of 900-pound stamps, with a crushing capacity of 1,000 pounds per week." What the last part of this statement means it is impossible to fathom; no doubt there is a typographical error; but we should hardly consider in this country a six-stamp mill a very powerful gold mining plant.

Again, Huntingdon mills are referred to as being for the first time brought before practical men in England. We are sorry that this should be so, as they were well tried and proved successful under appropriate conditions six years ago or more in California.

TECHNICAL BIBLIOGRAPHIES NEEDED.

In these busy days no one has time to keep up with the current literature of engineering, metallurgy and chemical technology. If an engineer, a metallurgist or a chemist succeeds in reading even the publications bearing upon his own immediate specialty, he finds his time pretty well occupied in this task alone. If he wishes to be informed as to what is going on in the world, in his own profession, he is obliged to subtract a large portion of his time from that which he would wish to devote to his own work, in the effort to keep "posted" in regard to the work of others. But if he attempts to widen his field of study and tries to preserve a reasonable familiarity with the progress in branches nearly related to his own, or goes further and endeavors to follow the advances made in scientific and technical matters at large, he will be likely either to turn bookworm outright or give it up altogether.

Simply to ascertain and remember the titles of books and the names of their authors is in itself a thing of no small difficulty. Never since the invention of printing has it been so true that of the making of books there is no end. But the reading of them, or even that portion of them which one would like or feels that he ought to read, is out of the question.

Apart from the new publications which are constantly pouring in, there is also the vast mass of the standard literature of the past, to which reference is also desirable if only to ascertain the history, the errors and the successes there chronicled, and which have an important bearing upon the projected enterprises of the present. It often happens that a man engaged in working out what to him is a new problem wishes to know when and how, if ever, that same problem has been attacked by his predecessors. He may even have a vague shadow of a recollection of having seen somewhere something bearing upon the point. But where? Is he to ransack whole libraries in search for the elusive reference?

Frequently, too, one has occasion to hunt up information on some subject out of his own particular line, and needs that information at once, and from the most authoritative source. Take the case of a mining engineer, whose profession places him in the unfortunate position of being required or supposed to possess a little knowledge of almost everything under the sun; and whose daily work, especially if he is in charge of some small property in an out-of-the-way place, where he is left with sole responsibility and without a single expert assistant, is likely at any moment to bring him face to face with some new and unexpected difficulty not provided for in an orthodox engineering education nor apt to have been met in his previous experience. Conundrums in endless variety are bound to arise, many of which could be readily solved by referring to the proper works on the subject. But a mining engineer cannot take a library with him. His "book larnin'," or such part of it as he can remember, must be carried in his head. In such a case what is wanted is to know just where to find a particular point; knowing that, he could send for the book.

People who are not engineers also have frequent occasion to look up something or another, perhaps of too slight importance to warrant calling in professional advice. Such persons are still more hopelessly at sea when they try to read up on a strange subject.

Every day we are in receipt of inquiries from persons in all sorts of occupations, professional and otherwise, and from varied localities, asking us to recommend the best book on this or that subject, sometimes the inquiries requiring us to submit a considerable list of works in order to cover the ground. Such questions we are always ready to answer when possible, though they are sometimes puzzling; and we also furnish our correspondents with the books wanted, at the publishers' rates. To facilitate the selection of books we have now prepared an extensive classified catalogue of standard scientific and technical publication, which will be sent to any one desiring it.

Two things are imperatively demanded of the book makers by the book users. In the first place, the books themselves, and reference and text books more than all others, should always be prepared with a view to their most convenient use by the reader. There is a growing call for monographs and treatises on well-defined single subjects, in place of rambling, disconnected publications containing a little of each of a good many things. Fault is also to be found with the unsystematic arrangement which mars the usefulness of so many works of this kind. Then, every book worth printing certainly is worth a clear table of contents and a good index. In this respect it is rarely that the books which most need such aids are found to be properly provided; though, by dint of constant hammering, the reviewers have succeeded in getting writers and publishers to pay more attention to the matter.

But in the second place—and this is what we wish to call attention to now more particularly—there is urgent need for a series of bibliographies on mining, metallurgy, civil engineering, chemistry and assaying, mechanical engineering, mathematics, etc.; and in each of these a bibliography classified according to the subdivisions of the subject. For example, in civil engineering would be needed bibliographies of railway construction, surveying, architecture, bridge building, and a dozen other specialties. And by a bibliography we mean something more and better than mere lists of titles, authors and publishers, with the size of the books and the number of pages and illustrations, and a few other dry details. For bibliographies of engineering, not only the books, but also the papers contributed to the transactions of the different technical societies and to the periodicals should be included, and some idea of the nature of the publications cited should be given. A bibliography which would give with each reference something corresponding to a good table of contents would be worth having. Such bibliographies are being prepared for certain scientific specialties, but they are usually buried in the pages of other books. They should be issued separately. But who will be enterprising and public-spirited enough to attempt this work for the technical literature? The field is an open one; who will occupy it?

At present, for many branches, the only lists accessible are the catalogues of libraries and the trade circulars of publishers. These are unsatisfactory, in that they are wanting in the detail which the book seeker requires.

BOILER STEEL SPECIFICATIONS.

The report of the Committee on Materials and Tests of the American Boiler Manufacturers' Association, presented at its recent meeting in Pittsburg, if carried into effect, will mark an important step of progress in the boiler-making art. Less than ten years ago the question of using steel for boilers was a disputed one, not because the quality of steel boiler-plate was not as good as it is to-day, but because boiler makers and users had not been fully educated to believe in it. The largest boiler makers in the country still continued to use iron, and refused to consider the question of steel at all. So rapid, however, has been the adoption of steel that a Committee of the Boiler Manufacturers' Association now reports that there is no longer any reason why iron should be used, nor why steel should not be used universally.

No doubt the chief cause of this rapid substitution has been the fact that the steel mills have within the past ten years provided themselves with such magnificent facilities for handling steel in large masses, twenty-ton open-hearth furnaces, 120-inch three high rolls, and the like, that it is now possible to make the best grades of fire-box steel at lower cost than even a fair grade of charcoal hammered iron. Just as steel rails finally drove iron rails out of use, only after it became possible to make steel rails as cheaply as iron ones, so the driving out of iron boiler plate is now taking place when the price of steel plate becomes cheaper than that of iron.

It has taken boiler makers and steel makers a long time to fully understand and act upon the fact that the tensile strength of the best steel boiler plate is not any greater than that of charcoal iron plate. When steel was first introduced, about thirty years ago, one great argument for its adoption was that it was so much stronger than iron, that a lighter boiler could be made of it. Steel was used having a tensile strength of over 80,000 pounds per square inch. The result was that the plates were so brittle that many of them failed before they were even riveted into the boiler, and many serious accidents resulted. Such accidents gave a bad name to steel, and delayed for a long time its general introduction.

Gradually, however, one steel manufacturer after another learned that to make good boiler plate carbon and phosphorus must be kept down to very low limits, and tensile strength be sacrificed. The Otis Steel Works, of Cleveland, Ohio, were among the first to recognize this, and the splendid reputation that company obtained more than ten years ago was due chiefly to that fact.

The report of the committee above referred to has set the seal of its

condemnation upon the notoriously incorrect shape of the grooved test piece which is specified in the rules of the United States Treasury Department for the inspection of boilers used in steam vessels. It is strange that this form of test piece should have been permitted to remain in use for so many years, and it marks the perfunctory apathy in the execution of the duties of the supervising inspectors that they should not themselves have made an effort to get the rules amended, so that when they reported the strength of a piece of boiler plate tested, they should not have been compelled by law to report a highly exaggerated and incorrect result. The committee favor the shape used in tests for the United States Navy, which is in use also in Great Britain and other foreign countries. On this test piece the committee specify that the metal shall show the following physical qualities:

The tensile strength shall be from 55,000 to 65,000 pounds; the elongation shall be 20 per cent. for plates $\frac{5}{8}$ inch in thickness or less, 22 per cent. for plates from $\frac{5}{8}$ to $\frac{3}{4}$ inch in thickness, and 25 per cent. for plates over $\frac{3}{4}$ inch. The reduction of area test is condemned as unreliable. Good boiler steel up to one-half inch in thickness should be capable of being doubled over and hammered down on itself without showing any signs of fracture, and above that thickness it should be capable of being bent round a mandrel of a diameter equal to one and one-half times the thickness of the plate to an angle of 180 degrees without signs of distress.

These specifications ought to be complied with by any manufacturer of boiler plate steel without difficulty, but the following recommendation, we think, will cause trouble to both the steel maker and the boiler maker:

"We recommend that all tests be made at the steel mill. Three pulling tests and three bending tests shall be made from the plates of each heat. If one of these fails the manufacturer shall have the right to prepare and test a fourth piece, but if two fail the entire heat to be rejected. When a member of this association orders a lot of steel from a steel manufacturer he shall be entitled to receive a certified copy of the chemical and physical tests of the heat from which his plates are made, which must conform to the above requirements. It is, of course, understood that all boiler steel must be made by the open-hearth or crucible process."

The rejection of a whole heat of steel because two plates rolled from it have failed does not seem to be a correct way of sorting good from bad steel. It may happen that two plates rolled from one or two ingots and finished rather cold might just fail to show the right percentage of elongation, while the plates from all the rest of the heat, being finished hotter, would be more ductile. On the other hand, the test pieces might be taken from a hot finished plate which might show the ductility called for in the specifications, while all the other plates of the heat, which, if tested one by one, might show insufficient ductility, are passed without test on account of the good behavior of the test piece. If a complete check must be had on the steel maker it will be necessary to test a piece cut from each plate. This is the custom in some of the largest boiler works and shipyards in England, and is, we believe, followed by the Pennsylvania Railroad Company in their contracts.

In one steel works in this country the custom in making boiler plate steel is to test each heat as it is made for carbon percentage, and mark the ingots of each heat with the serial number of the heat. When an order to roll ingots into plates is given, the ingots are selected which have the proper carbon percentage for the particular grade of steel called for, as "firebox," "flange," or "shell." When they are rolled the plates are marked to identify their carbon percentage. On shearing the plates to size a piece is cut from each, which is tested by the bending test, and by the testing machine, if required by the customer.

In addition to the report on steel for boilers, the committee have made a most important recommendation concerning the use of cast iron in boiler making. They say: "The unanimous opinion of all parties is that the use of cast iron in mud drums, legs, necks, headers, etc., and in any part of boilers where it will be subject to tensile strains, is dangerous, and should not be permitted. For handhole plates, crabs, yokes, etc., of manheads it may be used, but only a superior article, such as is generally known as 'gun metal,' should be thus employed, *i. e.*, a metal of soft gray texture and of a high degree of ductility."

This condemnation of cast iron in parts of boilers subject to pressure has recently been emphasized by an accident to one of the well known types of water tube boilers in the Edison electric light station in Kansas City. Four of the upright sections or headers burst simultaneously, the front doors were blown off, and two of the attendants narrowly escaped death. It is time that in this country these parts of sectional boilers were made of wrought iron and steel, as they are now being made in Europe.

Extraction of Tin from Slags.—The object of this invention, by J. Shears, of London, is to extract waste metals from refuse slag and debris of tin smelting works. The ore or slag is reduced to a powder, and in that state is fused with any alkali. The mass is then dissolved in boiling water. The peroxide of iron, with the nickel and cobalt, fall to the bottom, and are separated by decantation. The tin is eliminated from the remaining liquid by passing an electric current through anodes immersed in it, and it falls to the bottom of the vessel in a fine metallic powder. One claim is made for the process described.

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The Reymert Mines, Arizona.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have observed several articles now and then in your valuable journal, from the pen of your "Special Correspondent," concerning "The Reymert Mines." The last one is in your December 14th number, p. 528, in which he says: "The mines should be the best in the territory, but the management has followed the most parsimonious course, the object seeming to be to save a few pennies, though losing time and dollars." And again, "The true way for that mine (13 claims) would be, to construct a narrow gauge railway, 14 miles, to Gila River, and work a 100-stamp mill, with a Stetefeldt furnace as roaster and with some pyritous ore."

There are many men around a mining camp who like to see themselves in print, and who have everything to gain and nothing to lose from the operations of mining companies. They are ever ready to give advice and to find fault with "the management" when it is acting in the true interests of the stockholders and with disregard for the outsiders.

The latter live on wrecks and fatten on squandered means by mining mismanagement. The country is full of wrecks, empty mills, abandoned camps, useless machinery, etc. In this Pioneer mining district, Arizona, there are over 2,000 mining locations, and the Reymert mines are the only successful ones promising permanent prosperity, and which have been developed purely as a mining business by the individual efforts of the owners, without gambling or stock deals. Why have none of the others been successful, with their millions of money spent in the lavish mode suggested by your correspondent? I answer, Because of bad management.

These mines were all abandoned prospects when Judge J. D. Reymert in 1879 located them and spent his own time and money exclusively in explorations and development, until he had over 2,000 feet of shafts, tunnels, winzes, drifts, and cuts all along the two miles of this fissure vein.

Many years of toil and the expenditure of many thousand dollars proved these mines to be an immense deposit of ore in a permanent formation. Within the last four years a company was incorporated in San Francisco under the name of the "J. D. Reymert Mining Company."

The mines are situated in Pioneer Mining District, Pinal County, Ariz. That organization still exists, although a majority of stock is now owned by Milwaukee capitalists. From abandoned locations by the early prospectors, the country is now opened; there are roads, trails, dwellings, business, an industrious population and a 20-stamp mill, with five stamps more on the ground ready to put up, together with roasting capacity for 65 tons per day, and ample capacity of pans, setlers and steam power. The company has expended not less than $100,000 within the last year in development work and additional machinery. The enterprise is of a private nature, and I suppose it has a right to regulate its own business. I don't know of any stock for sale. It is out of debt and advancing safely and prudently, enlarging as fast as good sense will dictate.

To construct the 14 miles of railroad to the Gila River would cost not less than $300,000 or $400,000. And for what purpose? To get a doubtful supply of water from the Gila River, when there is a certainty of plenty where the works now are; to send ore 14 miles by railroad to be worked at Gila River, when it is, and can be, worked to equal advantage on the mines, and far cheaper.

It does not appear that the Reymert Company is inclined to squander any money on wild-cat schemes. GAY.

PINAL, Ariz., January, 1890.

MIDDLESBOROUGH, KENTUCKY.

By C. R. Boyd.

Knowing the absolute distaste of the readers of the ENGINEER-AND MINING JOURNAL for anything, in statement, that may appear extravagant, due care has been exercised, I trust, in the preparation of the following lines, to exclude everything in description not thoroughly warranted by the condition of affairs in and around Middlesborough, Ky.

After what I conceive to have been an exhaustive study of the situation, it would seem that this place owes its existence rather to a correct interpretion of all the relations growing out of the valuable character of the physical geography of this region, than to that spirit of irresponsible speculation so characteristic of the age.

That, in new places of so great phenomenal growth, speculation is rife among certain classes, is not to be wondered at; and neither will an impartial and candid investigation of all the conditions, here, fail to impress one with the high aims and fine judgment of those gentlemen who projected this movement.

With careful discrimination, the propositions of various companies and individuals of high commercial standing are being accepted as rapidly as due circumspection will permit to place here plants of nearly every description of manufacturing enterprise. The utmost care is employed to see that no one undertakes more than he is able to perform; and that nothing but the best approved systems are adopted in everything.

Out of the many millions offering, $15,000,000 have thus far been accepted since the 14th day of October last, the date of the birth of the town, about which time, also, the railways which connect Middlesborough with all existing systems of transportation were completed.

Phenomenal in themselves, these facts are among the best practical proofs of the existence here of those resources upon which this entire movement is based.

The site of Middlesborough is near the junction of the three States of Virginia, Kentucky and Tennessee with the Cumberland Mountain, at a point where that mountain is most heavily charged with its stores of coking coals, iron ores and limestone.

It is 1,050 feet above sea level, in a plain on the south margin of the great plateau of the Cumberland, on the banks of a large affluent of Cumberland River. Its limits extend practically from Cumberland Gap

westward, six miles, with a width of 3½ to 4 miles north and south. The latitude of the place is 36 degrees 40 minutes north, and longitude 6 degrees 40 minutes west from Washington City.

Dillwyn Springs—in the same property—is "just over the Gap," in Virginia and Tennessee.

Middlesborough is, therefore, about 415 miles, air line, west from tide water. It is midway between New York City and New Orleans, being less than 650 miles from either place. Describing a circle around it, with a radius of 475 miles, you almost cut Chicago, St. Louis, Memphis, Norfolk and Baltimore. Within a much shorter radius are the great distributing centers afforded by Cincinnati, Louisville, Nashville, Chattanooga, Birmingham, Atlanta, Richmond, Lynchburg and Knoxville, with all of which easy communication by rail is established.

Its isothermal appears, now, to be that of the South of France. Its average rainfall is the normal of the Middle States, secured in its regularity by the existence of boundless areas of forest, which cover the hills and mountains for quite two hundred miles along the great Cumberland Range. With relation to which, so thoroughly is the language of Nature comprehended by those controlling the enterprise that all timber will be removed only under carefully prepared forestry regulations. Under these regulations, denudation will be impossible! For every tree marked for removal, two or more young trees are to be provided to replace it.

Through the tunnel, just completed at Cumberland Gap, toward which all railways contemplated for this region converge, communication is established with the seaboard and the entire system of railway and river transportation in America. Middlesborough also enjoys postal, telegraph, express, banking and insurance facilities with all the business world.

The principal railway systems converging here, or pressing their construction this way are: The Louisville & Nashville and the Knoxville, Cumberland Gap & Louisville completed; the East Tennessee, Virginia & Georgia; the Norfolk & Western; the South Atlantic & Ohio; the Charleston, Cincinnati & Chicago; the Middlesborough & Western; the West Virginia, Pineville & Tennessee, and the Richmond Terminal, via the Morristown and Cumberland Gap Extension.

A glance at the carefully verified cross-section here presented, will show that the physiographic conditions, from the hand of nature, present features of most imposing beauty and great usefulness. A radius of five miles, around Middlesborough, includes a mass of those elements in raw materials, which have proven to answer affirmatively the most critical inquiries of trained experience, science and skill. So well satisfied of these values have the promoters of this enterprise become, that they now own, in fee, more than twenty-three miles length of the ores shown in the section and more than 50,000 acres of coal lands lying around Middlesborough.

It will be understood, from the section, that the great floor or bedrock series, upon which the coal formation is imposed, has been brought up to and projected above the surface by some great cosmical pressure exerted, probably, from southeast toward northwest. So that, at the eastern approach to Cumberland Gap, the tilted edges of two thousand or more feet thickness of iron ore bearing rocks are presented to view. These rocks and ores outcrop in long lines running northeast and southwestwardly for quite a hundred miles along here. There are undulations and reverse dips, occasionally, in these ore strata, where exposed, which serve only to greatly increase the aggregate quantity of accessible ores. Then, as you pass through or over Cumberland Gap northwardly, within less than two miles of these ores, the dip of the rocks, which had been northwest at various angles, changes to the practically horizontal—the prevailing dip of the coal measures of the basin in which Middlesborough is located. The greater body of iron ores and the limestones, interposed between the ores and coal rocks, when mined, will descend by gentle grades toward the furnace locations in the town; toward which, also, the coals and coke all naturally gravitate. Nature seems, here, to have carefully planned all the conditions for the cheap manufacture of iron and its products, in quantities to meet the rapidly-increasing demand for all shapes in iron and steel.

The fossil ores occur in three veins, aggregating five to four feet between walls, and will afford stripping faces, on their inclination, of 2,000 to 600 feet above water. The analyses of these ores, by Mr. Edward Riley, F. C. S., analytical and consulting chemist, 2 City Road, London, is as follows:

Silica	12·20		
Peroxide of iron	80·16		
Protoxide of iron	Traces		
Alumina	3·94		
Oxide of manganese	·35		
Magnesia	Traces	Met iron	56·11
Phosphoric acid	0·30	Phosphorus	0·149
Sulphur	Traces		
Combined water	2·08		
Moisture	1·02		
	100·05		

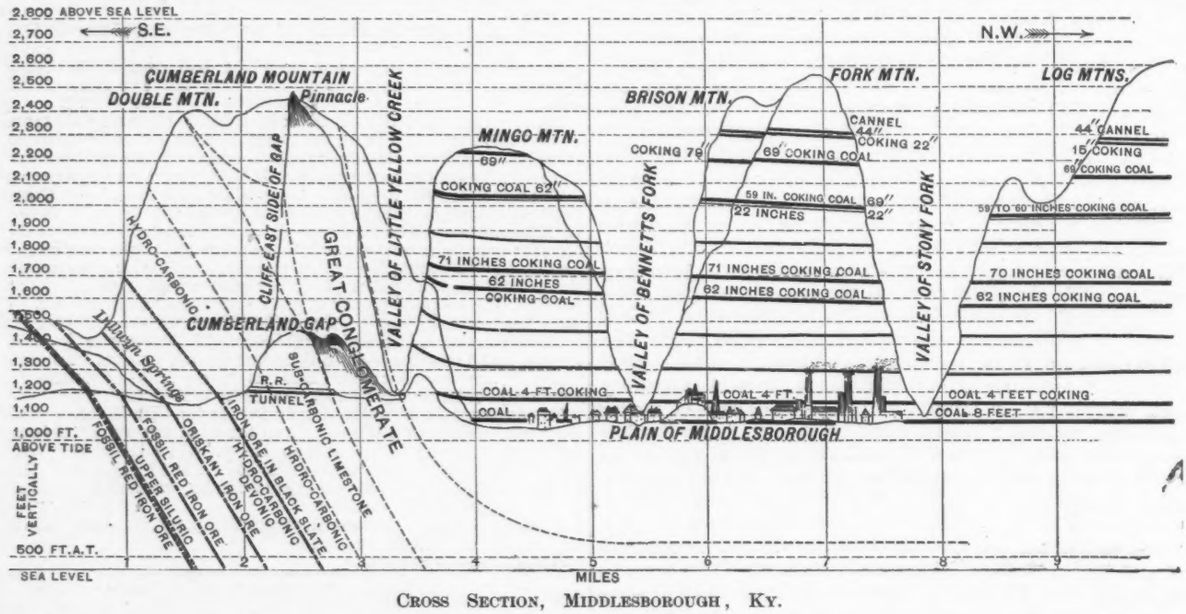
An average of eight openings in fossil ores gave for Kentucky geological survey, Professor Jno. R. Proctor, director, the following:

Iron.	Phosphorus.	Sulphur.	Silica.
50·33	0·142	·273	10·25

Red fossil ore analyzed by Messrs. Ledoux & Co., chemists, New York, gave the following:

Metallic iron.	Phosphorus.	Sulphur.
58·730	0·041	0·230

The Oriskany ore I examined, four miles southwestwardly from Cumberland Gap and Dillwyn Springs, was found in hills 180 to 300 feet above adjacent valleys. This ore would afford stripping faces over 1,000 feet on the dip of the ore bodies. One tunnel across the strike, driven by Messrs. Watts and Reis, had penetrated 415 feet into a high double spur of Cumberland Mountain, 199 feet of which was ore, and a large part of the remainder ocherous earth. It is generally estimated that this Oriskany vein will average 15 feet between walls. So thought the excellent authority, Mr. Jacob Higson, M. E., from north of England, a gentleman who recently looked at its entire length here. This 199 feet thickness is due to an undulation, doubtless; and as the ore at that place is easily won, many such undulations would increase the aggregate quantity possible to be obtained to almost unheard of dimensions.



CROSS SECTION, MIDDLESBOROUGH, KY.

But many of your readers may remember that these conditions really exist in the same geological horizon, at those places in Virginia whence are derived the ores for Longdale, Lowmoor and Princess furnaces.

These red and brown ores, for 23 miles along here, are now the property of the American Association, Limited, of London.

Mr. E. J. Bird, iron master, of Ironton, Ohio, is of opinion that the cost of mining and placing these ores on surface will not exceed 50 cents per ton.

The best analyses I could procure of the ore from these Oriskany deposits are those by Mr. Edward Riley, F. C. S., London, and Messrs. Ledoux & Co., New York.

Mr. Riley's assay gave: Metallic iron, 55·48; phosphorus, 0·066. Messrs. Ledoux & Co.'s assay gave: Metallic iron, 56·490; phosphorus, 0·006.

As to limestone, there is over 650 feet vertical thickness of that, fluxing material abundant and convenient.

In addition to the ores above described, the promoters of this enterprise own and otherwise control a large area of magnetic iron ores in the Unaka Range—about 100 miles to the southeast of Cumberland Gap—between which and Middlesborough intervene the magnetite ore deposits common to East Tennesse and Southwest Virginia that are found in the geological horizons of numbers I, II, III, IV, V, VII and VIII, Pennsylvania Nomenclature. The Unaka magnetites range in metallic constituent from 68 to 45 per cent. iron, and from 0·01 to 0·05 phosphorus. These ores, which are distinctly Bessemer, together with the brown and semi-magnetic red hematites just mentioned, will increase many hundred-fold the iron ores controlled by Middlesborough; and I mention them only after ten years' inspection of various parts of them have convinced me of their value and magnitude.

COAL AND COKE.

The identification of workable coal seams began almost within the limits of Middleborough. Both Prof. Jno. R. Proctor, Chief of the Kentucky Geological Survey, and Mr. Jacob Higson, M. E., claim the existence,

within the mountains shown in the sections, of 11 to 13 workable coal seams above water level. Their statements would corroborate and strengthen my observations as here shown; and I would judge that, out of 50,000 acres of coal lands, at least 25,000 acres would yield a positive tonnage of 25,000 tons to the acre of coking coal.

Carefully selected samples of coke, taken from the coke ovens, gave a hardness superior to any I had ever tried before. Its carbon constituent was sufficiently developed to make it scratch glass readily; and it may not be surprising, therefore, to find that it gave the following analysis in Kentucky State Laboratory, in comparison with other cokes:

	Fixed carbon.	Ash.	Sulphur.
Middlesborough coke	93·270	6·310	0·981—6 samples
Connellsville coke	88·962	9·741	0·810—3 "
Chattanooga, Tenn.	80·513	16·344	1·595—4 "
Birmingham, Ala.	87·290	10·545	1·195—4 "
Pocahontas	92·550	5·749	0·597—3 "
West Virginia	92·380	7·210	0·552—8 "

Mr. E. J. Bird, mentioned above, places the total cost of manufacture of a ton of coke, including cost of coal, here, at $1.42½.

The same expert, looking at the easy facility with which iron ores, limestone and coke can be brought together, places the cost of the manufacture of pig metal, at Middlesborough, at the following figures:

56 per cent. ore.		40 per cent. ore.	
1¼ tons of coke at $1.47½ per ton	$1.84¾	1⅛ tons of coke at $1.47½	$2.21¾
3,600 pounds of ore	1.44½	5,600 pounds of ore	2.25
½ ton of limestone at 30c. per ton	.15	1¼ tons of limestone	.37½
Labor and incidentals	3.00	Labor and incidentals	3.25
Cost of a ton of pig metal	$6.44½	Cost of a ton of pig metal	$8.09¼

The chapter of accidents for furnaces built anywhere, will, to a greater or less extent, modify the most carefully prepared tables of cost. But the four coke furnaces now in course of construction here, are being built by one of the most expert firms in the country—that of J. P. Witherow at Pittsburg. If any guarantee could be given that figures would not mislead, it would consist in the observation of the working of Mr. Witherow's furnaces under competent men. Take the one at Pulaski City, Va., for example. It is not only elegant in all its lines, but it appears, in its working, always the very perfected result of all the best experience in furnace building. In addition to the four coke furnaces now being built here for Messrs. Watts & Reis, of 150 tons daily capacity, each, there are also two charcoal furnaces under way, of 75 tons daily capacity, each. These are being built by Mr. O. W. Davis, Jr., and others.

These were among the first great results to the town of Middlesborough, following the purchase of the resources of this region by the English and American promoters of the movement, thus securing an investment of $2,000,000.

The Middlesborough Town Company had already anticipated this by promoting the formation of an electric lighting company, a belt line of railway, street railway, and the erection of a fine hotel, all of which are now in operation. Clustering around these iron furnaces—so truly the parents of nearly all other manufacturing enterprises—are the following, pushing forward during this mild winter:

Car wheel works, chilled plow works, barbed wire works, spiral welded pipe works, basic steel works, zinc works of 600 retorts, using zinc ores found within 12 miles of Cumberland Gap; galvanized iron wire, galvanized sheet iron, brass and copper wire, brass foundry, rolling mill and nail works, tannery, wood-working company, furniture company, handle company, planing mill, brick and tile company, three fire brick companies, employing clays discovered in adjacent coal measures; coal mining companies, coke companies, lumbering companies, three banks, water and electric lighting companies, a park company, and sanitarium, hotel and casino, to entertain 800 guests and patients, which are to be conducted under the supervision and direction of a carefully selected board of physicians and surgeons. These last named are to be erected at Dillwyn Springs, and are to surpass in every respect the most famous spas of Europe.

This place was almost wholly in tents on the 14th of October, 1889. It is now a rapidly growing manufacturing city of 5,000 inhabitants. Their first 500 lots brought the town company about $415,000; the next 475 lots brought about $310,000. The town company still own about 5,000 (five thousand) acres laid off in town lots, sales of a part of which will be made in May next.

As to churches and other institutions the place has now a good share.

This description, shorn as it is, of everything but a recital of facts, as I observed them, but faintly portrays the almost perfect realization of one of the highest and most perfect plans ever conceived in the fertile brain of man.

In this instance the man may be said to be A. A. Arthur, the general manager of the American association, who is ably seconded in the administration of Middlesborough's affairs by Mr. John M. Brookes, and by the treasurer, Mr. John B. Cary.

It is phenomenal! And well worthy of study are the great lessons it teaches, in the application of science, trained skill and unlimited capital to the development and utilization of apparently inexhaustible resources.

IN FAVOR OF FREE IMPORTATION OF ORE.

At a hearing before the Ways and Means Committee in Washington on the 24th ult., Mr. S. J. Ritchie, of Ohio, presented the following statement in favor of the free importation of ores from Canada.

The Canadian Copper Company and the Anglo-American Iron Company are two corporations organized under the laws of Ohio, and doing business in Ontario, Canada. They have erected mining plant, and put up and are running smelting furnaces, in which they are reducing nickel and copper ores, and shipping the product to Great Britain and Germany.

The ores contain nickel, copper, sulphur and iron. In smelting, the nickel and copper are saved in the form of matte, and the sulphur and iron are wasted. Within the last year nickel has come to assume a very important place in metallurgy as an alloy with steel. These results have been obtained in Great Britain, in France and in Germany. Before the discovery of the nickel deposits in Canada the supply of nickel was so small and the price so high that it would have been impossible to have supplied any considerable want, even had its utility been known.

"Our company," said Mr. Ritchie, "although an Ohio corporation, has, for all purposes in Canada, been made by the Canadian Parliament a Canadian company. The Dominion Government remits the duty on the American machinery which we send in to work these mines. It also remits the duty on the coke which we use for fuel. It also offers quite a large bonus per ton for the manufacture of iron and steel from this material. But the natural gas in the neighborhood of Findlay, O., is so admirably adapted to manufacture and treatment of these ores, and especially of our mattes, that we are seriously contemplating bringing all our ores to that place to be smelted. But we can only do this on condition that our own government shall admit them all free of duty—every part and constituent of them.

"Every stockholder in these companies is a citizen of the State of Ohio. Every dollar invested in them is Ohio capital, and in making this request we only ask that you treat your own citizens as liberally as the Canadian Government has treated foreigners who are American citizens. Besides the mines in Canada, there is only one other nickel mine of importance in the world, and that one is located in the island of New Caledonia, and belongs to the Rothschilds. It probably has not one-fifth part of the producing capacity of the Canadian mines."

In asking for the free admission of copper, nickel, iron, and sulphur, Mr. Ritchie said that we now derive no revenue worth mentioning from them, and, in admitting them free, give the broadest possible interpretation to the doctrines of protection. "Nearly all the mines in Canada," he continued, "and 80 per cent. of her lumber interests are owned by Americans, and their products are in every sense of the word the product of American capital and American labor. We are paying more for labor, freights, machinery, and provisions of every kind at our mines in Canada, than we could purchase the same for in the State of Ohio."

The following is the petition to Congress of the proprietors of iron and steel working establishments in New England, which meets with general support in that section of the country:

To the Senators and Representatives in Congress of the New England States:

The undersigned, proprietors or managers of iron-working establishments in New England, being members of all parties and believing that in the adjustment of the tariff a careful regard should be had to the rights and interests of all sections and of all the people; that the local interests of each section should be carefully watched by its delegates in Congress, and that, in order to be fully informed, such delegates must necessarily depend largely upon information furnished by their constituents, do hereby respectfully unite in calling your attention to the condition of the iron and steel working interests in New England, and to the effect of this condition upon the general interests of this section of our common country as fully set forth in a statement prefixed hereto. And, in view of the approaching revision of the tariff laws, we further unite in the request that you will insist upon the incorporation of the following provisions in any revised tariff law that shall be enacted:

First—That iron ore, coal and coke shall be put upon the free list, as they were before the war.

Second—That the duty upon pig iron and scrap iron and scrap steel which prevailed immediately before the war be restored, to wit: A duty of 24 per cent. ad valorem.

NOTES ON MATTE SMELTING FOR SILVER.

Written for the Engineering and Mining Journal by F. L. Bartlett.

It has always been my belief that not enough attention is paid to the smelting of argentiferous ores in blast furnaces without the use of lead. American smelters have not, as a rule, appreciated the idea that silver and gold can be concentrated and served by the use of sulphur iron and copper as well as by the use of lead.

Some experiments have been made in this way, it is true, but no great advance has been made in this line of metallurgy. The Boston & Colorado works at Argo have depended for years in the extraction of their gold and silver on sulphur and copper, but they use reverberatory furnaces entirely, and have special processes which cannot be adopted by isolated and small plants. The other smelters to a unit depend upon lead for the concentration of the precious metals, and this is all well enough when lead ore can be obtained cheaply and in quantity. There are, however, many places in the West where silver ores occur in quantity, and of a fairly good quality, but are bare of lead; such ores do not always contain copper, but as a rule do, and usually run from 1 to 3 per cent. in that metal.

I know from my own correspondence that there is great hesitancy on the part of mine owners to engage in the reduction of such ores by smelting; as a result, concentration, milling and chlorination are resorted to. It must, of course, be understood that many ores of the *dry* class contain so much silica that smelting would be quite out of the question; on the other hand, there is, I believe, a great deal of ore, especially in Montana, Dakota and Idaho, which can clearly come under the head of smelting ore.

In my own practice I have found no difficulty in saving gold and silver by smelting, either when copper was present, or when the ore contained only iron pyrite.

Experience has shown that a small percentage of copper enables one to make a much higher concentration of the silver and gold present than is the case when the matte must be made wholly of sulphide of iron. When no copper or lead is in the ore it has not been possible in my work to run the matte higher than 70 or 80 ounces of silver per ton, and make clean slags, *i. e.*, slags containing less than 1 ounce silver; but with copper, even as low as ½ per cent. in the charge, the silver can be run up to as high as 200 ounces; and with 3 per cent. copper in the charge, it can be run up to 700 ounces. Moreover, if the charge runs higher in copper than 2·5 or 3 per cent., no additional advantage is had; on the contrary, there is likely to be more loss of silver, therefore 3 per cent. may be considered the limit of the *best* results. The reason for this is, I believe, to be found in the fact that when an ore containing a small percentage of copper is smelted a very high degree of concentration can be

made without forcing copper into the slags; thus with an ore containing 3 per cent. of copper, a concentration of 20 to 1 can be made and the matte then only contains 55 to 58 per cent. of copper, while slags from such ore will rarely contain more than $\frac{1}{10}$ to $\frac{1}{20}$ per cent. of copper. If the ore ran 10 per cent. in copper, a concentration of not more than 5 to 1 would be possible, and even then the slag would be likely to run from $\frac{1}{4}$ to $\frac{1}{2}$ per cent. copper, which means loss of silver.

The ores most suitable for matte smelting in the blast furnace are those containing considerable iron or manganese, and the sulphur contents must be regulated by partial roasting when high, or by the addition of raw sulphurets when low, since the amount of sulphur present determines almost exactly the quantity of matte made.

I do not think I can do better for illustration than to give in full some notes just received from Mr. Herbert Lang, manager of the Porphyrite Silver Mining Company, of Mineral, Idaho. Mr. Lang's work, as will be seen, presents some new and unique features in silver matte smelting, and he certainly deserves great credit for having so successfully worked out the process, especially when it is known that he began with an entire green crew and is in a most remote and inaccessible part of the country. I will also add that the plant is very simple and inexpensive, the furnace being a simple, plain, but strong water jacket furnace of the round pattern, 36 inches diameter at the tuyeres, 8-foot jacket, provided with outside separating wells. The furnace is blown by a fan blower, which is, I think, for this class of work, better than a pressure blower.

The concentration, 20 to 24 to 1, seems excessive, and no doubt cleaner slag would be made to run 12 to 1; but Mr. Lang explains this fully by the fact that transportation is so high that it is cheaper to make the high concentration, consequently his matte runs from 500 to 700 ounces per ton.

I would especially call attention to his method of manipulation of the furnace, which shows some original and apparently good devices.

Matte Smelting at Mineral City.

"At the Porphyrite Company's smelting works we use a 36-inch Bartlett water jacket, with outside settling wells, and run off the melted products continuously. The proportion of ore smelted to matte produced is 20 or 25 to 1, an excessively high rate of concentration, but, under the peculiar conditions prevailing at this isolated camp, more profitable than a greater proportion of matte would be. The silver extraction is quite satisfactory, our slags assaying, week in and week out, only about 1½ ounces of silver per ton. The loss in flue dust probably amounts to 2 per cent. We use a blast of 6 to 8 ounces pressure, generated by a No. 6 Sturtevant fan, which requires about 10 H. P.

"Our mines produce two general classes of ore, denominated oxidized and sulphide ores. The former are well represented by the following:

ANALYSIS OF OXIDIZED ORE.*

Moisture	10·00
Copper	3·00
Silica	40·20
Sulphur	0·79
Oxides of iron	28·63
Oxides of manganese	1·35
Alumina	7·31
Lime	1·56
Magnesia	0·57
Cobalt, nickel, zinc	·60
Oxygen and carbonic acid, e.c.	5·52
	99·53

* Such ores carry on an average 40 ounces of silver, no gold.

ANALYSIS OF SULPHIDE ORE.

Moisture	4·00
Silica	27·77
Sulphur	6·18
Copper	1·20
Iron, as oxide and sulphide	17·78
Alumina	4·80
Zinc	1·73
Lime	11·00
Magnesia	0·63

(Oxygen, combined water, carbonic acid, and various unimportant constituents not estimated.)

"By a suitable mixture of these ores, and by adding limestone as flux, we obtain a slag of the following percentage composition:

ANALYSIS OF SLAG.

Silica	37·05
Ferrous oxide	17·66
Manganous oxide	7·85
Lime and magnesia	28·72
Alumina	7·43
Sulphur	0·38
Zinc oxide	0·41
Copper	0·10
	99·60

"Accompanying this slag, there is, as before remarked, a matte carrying about 36 per cent. copper and several hundred ounces of silver, with a trace of gold. This we sack and ship East to market.

FURNACE MANIPULATION.

"Our furnace bottom is made of adobes, sun-baked bricks composed of the ordinary sticky loam of this neighborhood, which answers perfectly well, and is much more easily repaired than if composed of the refractory and expensive materials usually recommended. For blowing in we use about 1,000 gallons of water per hour, but in regular running not over 400. It issues rather hot, being raised from a temperature of, say, 50 degrees Fahrenheit to 150 in passing through. We line our settling wells with a plaster of clayey ore and horse manure, which stays on well, protects the iron plates, prevents leaks, and, above all, after absorbing considerable matte, pays for its own smelting when we return it to the charge. The well as constructed by Mr. Bartlett is a handy device, and when handled with skill effects a good separation. We, I may say, do not lose a single piece of matte in a week's time, except when by inattention the well becomes full of matte and begins to run over into the pots. When a pot becomes full of slag, we run it out to the dump, turn the cake out and leave it until the hardened shell about the liquid interior becomes about an inch thick, when we break off a corner and let the inside escape. The shell contains the greater part of the values, and we save the lower part, some half-dozen pounds, to resmelt, which, by experiment, carries more metal, both copper and silver, than the rest. We are troubled considerably by fine ore sifting down in front of the tuyeres (our charge is ¼ fine), and obstructing the blast. To clear a tuyere and effect an entrance for the wind, I insert a tube or pipe of thin sheet-iron, open at both ends, far enough to reach through the mass of fine ore, and let the wind blow through. The tube in course of time melts off at the inner end, and the obstructing fines are slowly melted away also. It takes commonly about three hours to relieve a tuyere in this manner. We have practically to smelt with four tuyeres, one on an average being closed constantly, for as soon as we get the dirt away from one another is found to be closed. Tuyeres closed from accretions of slag we have no difficulty in relieving by simply plugging, when after a short time the slag is melted away, and, the plug being removed, the tuyere is found bright. I have caused to be made a set of thimbles of graduated sizes by which we can adjust the opening to the requirements of the moment. They are made of gas pipe, in short pieces, with one end flanged to prevent slipping in too far, and by their use we gauge the wind streams as we please, from one inch to the full diameter of the aperature. If the furnace gives signs of chilling at the tuyere circle, and especially if it begins to burn on top of the charge, we insert one or more thimbles in the offending tuyeres, thus diminishing the amount of wind blown in, while we do not change the speed of the blower, and very quickly the furnace resumes its normal condition So after a period of rapid driving, the fire gets up and the bottom cold, when to rectify matters we insert the thimbles rather than slow down the machinery, which produces an evil effect on the working of the furnace, which the diminution of tuyere area does not.

AMOUNT SMELTED.

"Making the rather acid slag shown by my analysis, we are not able to smelt the maximum amount due to this size furnace. We average 14 tons charge each 12 hours run, while running only one shift, which corresponds to about 30 tons daily. For experimental purposes, and making a more basic slag, we have, for some hours, smelted at the rate of 40 to 50 tons per day, which demonstrates sufficiently that our furnace is at least equal to any other well-known make in capacity. We smelt on an average eight and a half tons of charge to one ton of Connellsville coke."

THE GEOLOGICAL POSITION OF THE QUARTZITES.*

The Animikie Series.

This group of rocks, first so called by Hunt from its well known and imposing exposures about Thunder Bay, on the north side of Lake Superior, and at the time regarded by him as newer than the Keweenaw series, is described in the Canadian reports as a downward extension of that series. An examination of the ground made in connection with my studies of the Keweenaw series in 1880 served to assure me of the inferior position of the Animikie to the Keweenawan rocks. In my description, published as a result of that examination, I maintained this inferior position for the Animikie rocks, but departed from the Canadian geologist in holding to their equivalence with the original Huronian, with the Marquette and Menominee iron-bearing rocks, and with the iron-bearing rocks of the Penokee-Gogebic region. I also differed from them on several other points, viz., (1) as to the thickness of the series, which I make several times greater than that assigned to it by them; (2) as to the lithological composition of the series, which I have described as composed of quartzites, often arenaceous, quartz-slates, clay-slates, magnetic quartzites, thin limestone beds, and beds of a cherty and jaspery material, with which were associated several types of coarse gabbro and fine-grained diabase in great volume and in both interbedded and intersecting masses, all of eruptive origin; (3) as to the so-called "crowning overflow" shown, for instance, at the tops of Thunder Cape and McKay's Mountain, which is described in the Canadian reports as having being entirely erupted, not only after the accumulation of all the Animikie series, but also after the deposition and removal of thousands of feet of newer strata. In the existence of such a crowning overflow I decline to believe, it appearing to me to have been made up by placing together exposures belonging to a number of different layers interbedded at various horizons in the Animikie series.

During the season of 1883, aided by Mr. Merriam, I made an examination of the exposures along the coast between Grand Portage Bay in Minnesota, the point at which the Animikie appears on the lake shore from beneath the Keweenaw Series and Port Arthur on Thunder Bay, and also of the interior region as far westward as Lake Saganaga on the national boundary line. The exposures throughout all this area are very fine, and are of particularly great interest in the neighborhood of Gunflint Lake. The study of this region was made after having visited the north shore of Lake Huron, and served to strengthen me in the view that the Animikie series is Huronian. We found, indeed, many new points of similarity between the two formations and again between the Animikie and th South Shore iron-bearing rocks.

One of the most interesting points noted with reference to the Animikie series is the occurrence of strongly-marked continuous horizon of cherty and jaspery magnetic schists and quartzites near the northern edge of the formation. These beds are finely displayed on the north side of Gunflint Lake, and particularly on the eastern side of Lake Saganaga. They show also in great force on the north side of North Lake, on the Canadian side of the boundary line, where there are large bluffs of a jaspery rock, and again at several points in the vicinity of Thunder Bay. One of these points is along side of the Dawson road, immediately back of Port Arthur. The more quartzitic and arenaceous portions of these ferruginous beds present usually the ordinary flat-lying structure of the rest of the Animikie series, but the cherty and jaspery portions, frequently strongly charged with magnetic and other oxides of iron, present often peculiar irregularities and contortions in subordinate bedding, and also often a confused concretionary, and even brecciated appearance. All of these irregularities are very plainly sub-

*R. D. Irving in the Fifth Annual Report U. S. Geological Survey,.

ordinate to a simple bedding, corresponding entirely with that of the rest of the Animikie series. The jaspery ingredient constantly recalls jaspery and cherty materials associated with the iron ores of the Marquette, Menominee, and Penokee regions, and I anticipate that when we shall have completed our microscopic studies of them we shall get from them some light as to the origin of these confused and much discussed rocks. I may now merely say that thus far the appearances are certainly in favor of the view that all of these chert and jasper schists are original, and not the result of a metamorphism upon ordinary sedimentary deposits, though manifestly they are not of eruptive origin, as has been maintained by some.

THE PHOSPHATE BEDS OF FLORIDA.*

By Albert R. Ledoux, M. S., Ph. D.

A trip to Western Florida to-day reminds one of the early days of the oil fever in Pennsylvania, or the "boom" of a new Western mining camp. Anywhere upon the old pine barrens or among the hammocks you may meet the prospector with his augur. Wealthy men from Boston, Philadelphia and New York are in camp and shifting from day to day, as the tide of discovery flows—now here, now there. The county newspapers are in hysterics and are rapidly wearing out their display types. And the "Cracker"—the typical Florida poor white who "lives on gophers all summer and on Yankees all winter"—he is as nearly stirred up to animation and as nearly excited as he can well be. His land that he valued at $2 or $3 per acre a few months ago is now sought after at $10, $30, $100 per acre, and indeed I saw one poor fellow quite insane who was paid $300 for an option on his land who before had, perhaps, never seen a twenty dollar bill. He could not stand the sudden prosperity!

Before particularly describing the deposits or the material in detail, we may, with profit, glance for a moment at the general subject of commercial phosphate deposits.

There are two extremes—one the freshly deposited bird dung, as on the islands of the Pacific, and the other the crystallized apatite in our oldest rocks. It is a well-known German saying among scientists, "Ohne Phosphor kein Leben"—without phosphorous no life—and, indeed, many reversing the maxim believe that "Ohne Leben kein Phosphor," and think that the fact of phosphates being found in oldest rocks is a proof of organic existence away back in so-called "Azoic" ages.

Between the mineral apatite and the bird deposits we have every stage of transformation. When on the granitic and slate islands of Peru, where rain is hardly known, only fermentation can take place, we find the phosphoric acid largely soluble, and combined mechanically with oxalates, urates, &c., which when in solution will render soluble the di-phosphates also. But where these bird deposits are made within the rain belt and have been subjected to this action for ages, the soluble phosphate has leached out along with the ammonia and other saline and soluble components, and we have the deposits of which Avis and Orchilla islands are a type. But there is another possible transformation, and that is when the deposit is made on coral or limestone islands. Here the leaching produces a double decomposition, and phosphates of lime are produced that may form bluffs and hills, as at Aruba and Gran Connetable, for example. Sometimes the base may be all or in part iron or alumina, in all gradations from a small proportion to complete alteration into those less desirable phosphates. While there are many peculiarities, yet from the birds is the chief source of our tropical phosphate beds. It was once my fortune to obtain reliable data as to the rate of these deposits at the present day.

Some clients of mine sent a ship to a coral island in the Southern Pacific to bring away a cargo of bird guano. The birds were still there in countless thousands. The captain had been there for a load 20 years before and since that time no guano had been removed. At his first visit the crew had cleaned off a space and made a house of coral rock and, covering it with a sail, had used it for a shelter and store-house while at work. On leaving, the sail was taken away and the walls and board floor left. On the return, 20 years after, there was an average depth of 20 inches over the floor—an inch a year! The underlying limestone was altered into phosphate for a depth of several feet, gradually containing more and more carbonate in depth.

Besides the birds proper, there are many deposites due to bats, whose caves in Cuba, have furnished many cargoes of guano, recognized at once by the myriads of undigested horny wings of insects it contains. There are also large deposits of seal guano in several localities. These all may be considered of almost contemporary and primary origin, geologically speaking. But there is another class still that is of intense interest as well as great value. Following the Devonian—age of fishes—came the age of aquatic reptiles, not alone strange in their appearance but in their wonderful abundance.

In England the "Coprolite" beds formed by their fossil excrements and remains cover a large part of Suffolk and Cambridgeshire and have yielded thousands of tons annually. In France, Germany, Norway, Spain, Austria and Russia these beds are regularly mined. The last-named beds being 20,000 square versts in area. The entire structure of the Sombrero Island is a bone breccia, requiring blasting. Others again are nearly pure alumina-phosphate and of uncertain origin.

Coming back to our own country, besides the Canadian Apatite, we have the marls that extend along the Atlantic coast from New Jersey to Florida of the Eocene and Miocene. In these marls, on the Cooper and Ashley rivers in South Carolina, occur the famous phosphate beds. These are different from any others previously described and since their discovery in 1867 have produced millions in money, as well as being the salvation of the farmers in the whole sandy belt of the Southern States, the use of commercial fertilizers of which they form the base, in this country, extending day by day until not only throughout the South, but throughout all our Northern and middle States they are the main dependence of an increasing number of agriculturalists.

Years ago Ruffin of Virginia and Tuomey of South Carolina noted the abundance of nodules, or marl stones, in the marl beds of South Carolina, and also the large percentage of phosphoric acid which the marls contained, but they did not seem to have analyzed the stones themselves, or realized that they were of any value agriculturally. Perhaps they were not to be blamed for this, since some of the land out of which these phosphate nodules are now taken are the most barren in the State. I have analyzed samples of soil containing over six per cent. of phosphoric acid, but so barren of other elements of plant food that nothing would grow upon them. It was upon such lands that Ravenel produced such astonishing results by planting green crops and plowing them under. Their decomposition furnishing the organic elements lacking, and aiding in the solution of the insoluble phosphate, so that a subsequent crop could be grown with great success.

The phosphate beds constitute the most wonderful collection of these fossil remains for variety and extent which we have in the East. Associated with the phosphate nodules, which vary in size from a pea to masses of occasionally 100 pounds, are the bones of fishes, the teeth of great sharks, the fossil horse, elephant, etc., representing many geological ages. It is to be noted that these bones, teeth and other remains are only found associated with the marl stones and not in them, a point which is of great interest in considering the origin of these Charleston pits. This question of their origin is most fascinating, and has had my attention for several years

* An address before The New York Academy of Sciences.

ANIMIKIE ROCKS AT PARTRIDGE FALLS, PIGEON RIVER, MINNESOTA.

(The upper leap is over quartzites, dipping south, or away from the observer; the lower leap over a massive, vertically placed, east and west gabbro dike.)

but neither time nor text will admit of its discussion here. I will notice but one or two theories which have been advanced. By some these are believed to be segregations from the surrounding marl, by others the product of mollusks such as *Lingula pyramidata*, which is found in large masses on the present coast, whose shell is principally composed of phosphate of lime instead of carbonate. Others still believe that these masses represent the remains of ancient bird deposits on coral islands which, by successive submergence and emergence, by tide and river action, have been broken up, rounded and scattered through the sand, the same action accumulating and concentrating the other fossil remains into an accidental association.

The companies owning these deposits in South Carolina are said to have paid in dividends over $400,000 during 1889, and mined, as reported by the ENGINEERING AND MINING JOURNAL, 423,720 tons, the profit being therefore about $1 per ton on the average. Of this amount, 95,000 tons were manufactured into fertilizers at Charleston, 46,000 tons sent to interior points such as Atlanta for treatment, 221,000 tons sent coast-wise, principally to Baltimore, Philadelphia coming next, Richmond next, and New York next in quantity received, while 156,000 tons were exported.

The rock is either dug from the ground by pitting and trenching—called land rock—or dredged from the beds of creeks and rivers—called river rock—the latter has to be kiln dried before shipment. During 1889 the price has steadily risen, the average for land rock in January being $6 f. o. b. vessel; February, March, April and May, $6.25; June, July, August, $6.50, and from September to December, $6.75. River rock ruled in the winter at about $5.50 f. o. b. vessel, during the spring and summer at from $6 to $6.50, closing in December as high as nearly $7 in one instance.

Outside of the small area in South Carolina in which these nodules are found, hitherto the most careful search has failed to discover them in paying quantities, unless it be in North Carolina, where in some of the southeastern counties they have been discovered. Nevertheless, important industries are being built up upon the basis of North Carolina phosphates, and when the more Southern beds are more nearly exhausted, they will have their day and become very valuable.

My object in saying so much about phosphate deposits in general and South Carolina in particular before coming to my subject will be apparent when it is noted that the Florida deposits may be divided into two distinct classes, one almost exactly resembling in quality and manner of occurrence the South Carolina beds, and the other totally different.

Florida—west and south—presents, topographically, an extreme altitude above sea level of only 260 feet. Starting at zero at Fernandina on the northeast and following the railway survey on the southwest to Cedar Key, we have a succession of ridges and valleys. Maxwell (56 miles) is 57 feet above mean low water, while the summit of Trail Ridge (at 61 miles) is 210 feet. Gainesville is 128; Waldo, 150; Otter Creek, 19; Ocala, 100, with a ridge one mile below the town 160. The average elevation of Marion County is 80 feet.

The soil, agriculturally considered, is divided into sandy or "pine land"—on the ridges and "hammock land"—along the streams and swamps.

The geology of Florida has hitherto been very little studied, since it has not been considered by the State authorities worth while to spend any money for a survey, as they did not suppose there were any minerals, ores, or other thing of money value to be found within her borders.

The most complete summary of literature on the subject up to 1881 is found in the XXI. volume of the American Journal of Science, compiled by Professor Eugene A. Smith. After comparing and examining the data of Tuomey, Whiting, Allen, Conrad, Bailey, Burnet, Le Conte and Agassiz, Professor Smith concludes as follows: "From specimens collected by me at points widely distant from each other, from the observations of others as quoted above, and from the evidence derived from other sources, I am brought to the conclusion that almost the whole State of Florida, from the Perdido River on the west, eastward and southward, including the middle and western parts of the peninsula, certainly as far south as the latitude of Charlotte Harbor, has for its underlying formation the white or Orbitoides limestone of Vicksburg age, the exceptions as yet known being the Post Pliocene or recent limestones forming the Keys and the immediate coast along the western, southern and eastern shores and isolated patches, if not a continuous belt of Miocene limestone, between the St. John's River and the elevated tablelands westward. In many places near the coast in Wakulla County a very finely pulverized marl is mingled with the sand, imparting to it a great degree of fertility; this is the "Gulf Hammock" land of which much has been written. From inquiries and from the observations of Conrad and others, I learn that these hammocks exist all along the coast from Wakulla, through Taylor, Lafayette, Levy and Hillsboro Counties to Tampa Bay. This marl is also of Vicksburg age where I have examined it, and from descriptions which I have had from various sources it seems almost certain that the marls of the Gulf Hammocks in the other counties named are of the same geological age.

"About Ocala, southward and southwestward, is a belt of 'hammock' land, where an earthy, partly disintegrated limestone mingles with the surface soil. Reference to tables of elevations will show that this hammock land is 60 feet higher than the sandy plain of Ocala. My own observations in the interior confirm the statement of Conrad, with reference to the Gulf Coast, near Tampa, that the Tertiary limestone is certain to be the substratum of all the 'hammock' land. At Rock Spring, however, there is a bluff of limestone some 10 feet in height, and from this I was able to collect a number of fossils. They were submitted to Mr. Heilprin, who determined among them the following species: *Pecten madisonius, Venus alveata, Cardita granulata, Carditamera arata, Mytiloconconcha incurva;* doubtful were also *Cardium sublineatum* and *Oliva litterata.* This would make the limestone of Miocene age, as Mr. Heilprin states his belief that no Vicksburg species are associated with the shells enumerated. I do not know that Miocene limestone has been observed elsewhere in the State, but it seems probable that it will, upon examination, be found either in isolated patches, or forming a continuous belt between the Post Pliocene deposits towards the east, and the elevated country westward which has a substratum of the Vicksburg limestone."

After the above observations Professor Smith summarizes as follows (which I condense):

"(1st) The Vicksburg limestone is the oldest rock in Florida, and therefore the State was still submerged until near the end of the Eocene period. (2nd) After the deposition of the Vicksburg limestone (upper Eocene) Florida was elevated to its present level above the sea. (3d and 4th) After the Miocene submergence there was another elevation of Florida (5th and 6th) followed by a submergence during the Champlain period, and then an emergence which brought about the present topography and elevations substantially."

Our subject allows us to confine ourselves to the Western or Gulf counties, although any day may compel a rearrangement of our map and a new statement of these phosphate beds. At present, for a description of the new discovery, we can confine ourselves to the Gulf counties south of Wakulla and north of Tampa. There seems also to be a gradual concentration towards a center well defined and whose area at this writing may be defined by a circle whose diameter is 30 miles, and whose center is near Hernando in Citrus County. This includes Dunellen on the north and Floral City on the south, and is roughly bi-sected by the Withlacooche River from southeast to northwest. I am aware that wherever I locate this imaginary circle I shall incur the wrath of boomers and speculators outside of it and pass by many valuable localities. But it must be remembered that I admit the existence of large areas of phosphate-bearing land outside of this area for 200 miles.

The marl stone or nodular deposits, as at Peace River, have been known for some years, but excited little attention. Many years ago officers of the United States Coast Survey called attention to the occurrence of fossil bones and phosphatic nodules in the outlets of several of the western creeks and rivers, but they attracted little attention except as curiosities. At the Smithsonian Institute in Washington, and at the Sub-Tropical Exposition at Jacksonville are to be seen many wonderful and interesting specimens of such remains. As long ago as 1887 attempts were made to work, on a commercial scale, these phosphate deposits of this class, and in Peace River on the south and in Wakulla County on the north are factories for this purpose. Attention was called to them in the "Mineral Resources of the United States" for 1887. This is also true of several points on Tampa Bay and even in the vicinity of Fernandina. New York gentlemen had interested themselves in some of these companies prior to 1887, and these nodules collected principally from the streams and bays were gathered, dried and treated. The method of procedure at the Peace River Works, which are, perhaps, the most extensive, as yet is very simple. The De Soto Mining Company's works have a storage capacity of 1,500 tons and have been in operation since last fall. A centrifugal dredge is anchored in the river and the sand and pebbles drawn up and discharged into a revolving screen. The former, being very fine, washes through the mesh, while the coarser particles, consisting entirely of phosphate nodules, are discharged into barges, where they are taken to the works, dried and shipped. The current of the river seems to re-deposit the material nearly as fast as it is removed, or, at least, exposes it by washing away continually the finer and more mobile sand.

In appearance and composition this phosphate differs very little from the South Carolina material. They are identical. Up to last fall this class of deposits, just described, were all that were known of the Florida phosphate beds, and attracted comparatively little attention. They were carefully looked into by the representatives of the phosphate interests of Charleston, who reported that owing to the difficulty of access and the method of mining necessary, due to the comparatively small size of the particles, rendering the operations expensive, the South Carolina article need not fear any immediate or very active competition in this direction.

Suddenly, however, in the last fall, some progressive orange grower in the vicinity of Ocala, with a little more curiosity than his neighbors, sent to a chemist a sample of white subsoil which occurred in his grove, and with which everybody in that section had been familiar, supposing it to be only limestone, for it had been found in every well in the neighborhood. The chemist reported that it was 80 per cent. phosphate of lime. The secret got out and then the excitement began. It may be said to-day, in all seriousness, that there is more danger that too much phosphate has been discovered than too little, and that a reaction in the market will take place which may maintain values below the cost of Florida production for a little while. Yet the world will take it all and there is really to-day a scarcity in the market.

In the area described at the beginning of my remarks covering Citrus County, Marion and Hernando counties, it seems that almost anywhere a pit or augur will reveal phosphate. In no pit or opening that I visited in this section did I find it entirely absent. The very soil in some of the hammock lands is impregnated with it, as in South Carolina, while the ground around old wells and cisterns reveals its presence.

Outside of this region, as already said, both north, south, and west, there are undoubtedly large beds whose extent and grade are as yet imperfectly ascertained. They lie in lenticular beds upon the limestone—or beds of lime carbonate, as they might better be called, as they are rarely hard enough to be called a rock—and are covered by the sandy soil and clay subsoil, rarely cropping out at the surface; a valuable indication to me of their existence or otherwise beneath the surface was an examination of the ant hills and gopher holes upon the tract. The earth thrown up by the former was interspersed with small whitish grains. These were found to be phosphate, and on digging or boring in the vicinity the deposit would be disclosed. A handful of sand from an ant hill submitted to analysis showed the presence of about five per cent. of phosphate. The phosphate is found at varying depths below the surface, sometimes within two feet and sometimes 10 or 12 feet down. In sinking a pit it is sometimes difficult to tell where the clay ends and the phosphate begins; they shade into each other, at times gradually, at other times the clay is entirely absent, the sand being the only thing between the surface and the valuable mineral. When wet they are dark or light yellow, but usually a dazzling white when dry. The thickness of the beds is very variable, and there is nothing to indicate it on the surface; it may be a few inches, or it may be 10, 12 or 16 feet of solid ore. A surface indication that is considered of value by some experts, as indicating the presence of phosphate below the soil, are masses of flint or silicious rock protruding from the surface, which seem to have segregated when the influences were at work which changed the carbonate of lime into phosphate, as has undoubtedly

been the case. The area of some of the phosphate beds is sometimes also defined from curious boulders and masses of a hard phosphate rock, white or yellowish white, which has withstood weathering remarkably, and which is quite rich in phosphate.

As said, the phosphate proper varies in color from a dazzling white (when dried) to cream color. Professor W. P. Frost of Savannah, to whose publication I am indebted for a description of the Dunellen field which I did not visit, states in regard to the quantity: "I myself saw an augur bored 16 feet into this stuff without going through it. It remained of the same consistency throughout—perfectly smooth and free from grit. It was a solid bank of phosphate 16 feet thick to my certain knowledge, how much thicker I do not know, but the natives, who are ignorant men, not knowing the value of the material, testified that they had seen wells dug 60 feet through this material to reach water-bearing strata." Professor Frost, in speaking of the area at Dunellen, estimates that over 3,000 (out of 13,000)acres are underlaid with the mineral, which occurs in ridges and pockets, running by his analyses from 50 to 65 per cent. and averaging between 55 and 60 per cent. Considerable of this new phosphate has reached the more northern mills and is being experimented with—several tons having been shipped to Atlanta and elsewhere.

It is the policy of those who are securing land—and everybody in Florida seems to be of this class—not to prospect too much or commence shipments until they have gotten all that could be obtained. Dr. C. U. Shepherd, of Charleston, the foremost expert on phosphates in this country, has established a laboratory at Ocala, and with guides, tents and horses is swinging round my imaginary circle, with headquarters near Floral City when I was there.

In what I have said above I have depended considerably on reliable information, especially as to the more southern and northern sections of the phosphate area. My personal observation was made in the area lying between the Withlacooche River and two large lakes upon which are situated the towns of Thompkinsville and Floral City. At the orange grove of Dr. Hawkins, a mile southeast of Rutland Post Office, on the river, the surface boulders showed the existence of phosphate, and it was apparent in the cistern which was being enlarged. On the adjoining plantation, in the midst of an orange grove, several pits have been sunk, revealing the presence of phosphate in numerous nodules or masses in the sand, but not in place, these masses nevertheless being so numerous as to make up, I should say, fully one-third of the material excavated below a depth of three or four feet from the surface. These masses were of a yellow color and quite hard. These deposits were in high hammock lands near the river, but owing to the difficulty which will be experienced on all low grounds from water, many of this class will be comparatively difficult to work. But on the pine ridges which constitute the greater area in Citrus County this difficulty will not be encountered, especially because it seems necessary to go through the compact phosphate material to strike water, and above this point, I believe, only surface water will have to be contended with.

Among these pine ridges in the vicinity of Floral City are many localities which have been carefully examined by others, and from which I obtained specimens running from 60 to 85 per cent. of bone phosphate, the latter being a pure white article from the bottom of a well, which was stated—and I have no reason to doubt the statement—was at that time 13 feet deep in solid phosphate.

Not far from Floral City were two properties (among many) controlled by Mr. Collin M. Hawkins, of Raleigh, N. C., and which, in company with Dr. H. B. Battle, the North Carolina State Chemist, I examined with considerable care, the results of which will serve as a type of other lands in the vicinity. The tracts were rolling and consisted together of about 100 acres of sandy pine land, having some 15 or 20 acres in productive orange groves. They had been developed by pits sunk at irregular distances in a zigzag manner across the field, being distant respectively from each other 138 yards, 226 yards, 93 yards, 84 yards, 60 yards and 126 yards. They had all gone down until the phosphate was exposed, or until the owner of the land became discouraged at his supposed inability to find it. I may say here that with the eye alone the most experienced chemist—unless his experience has been obtained in Florida, and that within 60 days—is utterly at a loss and his judgment no better than that of the average "cracker." I could not tell by the eye the difference between the white carbonate of lime or phosphate, nor between the calcareous clay and cream-colored phosphate, and was much surprised at finding large percentages of phosphate in samples from pits which I had set down in my memoranda as not showing any valuable mineral. A sample from pit No. 2, marked by Dr. Battle as a poor specimen (in which I concurred), showed by analysis over 61 per cent. of bone phosphate. The samples from the seven pits above indicated yielded respectively about 61, 58, 62, 69 (another "poor specimen"), 50, 32 and 41 per cent.

There had been in the vicinity other pits on this property, and just over the line, opened by previous prospectors before the property came under the control of Mr. Hawkins, which they had carefully filled up before leaving. These were not re-opened during my stay, but specimens picked up on the surface of the ground showed 64·85 per cent. of bone phosphate 67·59 per cent. and 64·59 per cent. In one pit, which was situated upon a rise of ground, and which did not strike the phosphate until some 12 feet below the surface, an augur was run down to a depth of between two and three feet and the boring yielded 50 per cent. of bone phosphate; as the augur had no handle we could not go deeper.

The examination of these properties showed, first, the probable presence of phosphate underlying nearly the whole area, and, second, that there was considerable variation in the percentage at different depths. The deeper one goes into the material the freer it is from clay and sand, and the purer. Unlike the samples from the hammock land that I have alluded to, these pits were quite uniform and solid, but even in some of the hammock properties I am informed that, in prospecting, the detached masses, if thrown on one side in digging and the sand on the other, will nearly equal the latter in bulk.

An analysis of the Pease River phosphate obtained from river dredging in samples submitted to me, and which are shown here, showed in the coarser particles 58·42 per cent. of bone phosphate, and in the finer 60·38 per cent. In the samples from the Hawkins property spoken of, the percentage of oxide of iron and alumina varied from 5 per cent. as a minimum up to 10 per cent. as a maximum. In a sample from the hammock land, the maximum 15½ of oxide of iron and alumina was found. The presence of iron and alumina, so universally dreaded by many of our American fertilizer manufacturers, was detected very early in the investigation of these Florida beds, and yet on practically working the rock it was found that in spite of these elements the other difficulties in such cases were not encountered, the rock dried out fairly well and did not "revert" after treatment.

Professor Frost, above quoted, called attention to this fact and says: "I can only account for these injurious constituents not acting in their usual way by supposing that the presence of lime counteracts their presence." I venture with some hesitation, in the absence of any thorough investigation, to say that from preliminary tests I think all other explanation possible. Besides the phosphate of lime there is in an of the samples a certain amount of carbonate—in the rich specimens very little more than there is in the South Carolina—and also considerable sand or matter insoluble in dilute hydro-chloric acid. An examination of this latter shows the presence of considerable clay. As all of the phosphate is readily soluble in dilute acid, while the clay and silica are not, I am led to believe it is possible that the phosphoric acid is practically all combined with lime and not with iron and alumina, and that this fact may have been overlooked by chemists who have simply determined the total amount of phosphoric acid, silica, alumina and iron, regardless of their combination.

The nodules in the hammock district, which I analyzed, may compensate for their not being a continuous body by being of very high grade. The specimens I gathered showing respectively 74·32 per cent. and 71·69 per cent. of bone phosphate.

In closing, I desire to call your attention to the fact that in the present state of the developments there is as yet great uncertainty, that I have personally examined but one part of the field, and that somewhat superficially, but believe that the facts I have stated, and which I have obtained with considerable pains from reliable sources, will be found sufficiently correct to give a fair bird's-eye view of the situation, and that the phosphate trade may put it down as settled that there is an enormous quantity of high grade material accessible, with comparative ease, in Florida, and that unquestionably the center of production must leave Charleston in the very near future. While there is much of wild speculation and reckless investment in these properties, there is also a magnificent opportunity for intelligent expenditure of money for well-chosen property, and great fortunes are to be made in the State, which but yesterday attracted little attention excepting for its climate and its fruit. For investors to go down at this late day is, perhaps, useless, but with the co-operation of those who have been in Florida from the commencement of the excitement, and have intelligently tested and secured the best lands, there is a splendid field for Northern capital.

10 CEDAR STREET, NEW YORK, Jan. 28, 1890.

[It is reported that not a little of the Florida phosphate from districts not examined by Dr. Ledoux is chiefly phosphate of alumina which has no commercial value. We trust that some of our readers who have investigated the subject will throw further light on this very important, as well as interesting, matter, which Dr. Ledoux has so ably introduced. —ED. E. AND M. J.]

ELECTROLYTIC WHITE LEAD.

The following is described in the *Electrical World* as a process for the electrolytic production of white lead, recently patented and put in practical operation by Mr. Turner D. Bottome, of Hoosick, N. Y.

The process devised by Mr. Bottome consists in electrolytically dissolving a lead electrode in an electrolyte containing nascent of free carbon dioxide, whereby the lead compound formed by electrolytic action is precipitated to form hydrated carbonate of lead, or pure white lead, which is then removed, washed and dried.

The manner in which this is accomplished is as follows: The electrolytic solution is prepared by dissolving in the proportion one-half pound each of sodium nitrate and ammonium nitrate to one gallon of water, and then saturating the solution thus formed with carbon dioxide, which can be done in various ways. Sodium carbonate and ammonium carbonate may be used in the place of the nitrates; but in that case nitric acid must be added until the bath is about neutral, which results in the larger portion of the carbon dioxide being driven off during effervescence. The electrolytic solution is then placed in a tank and electrodes of metallic lead are immersed in the same. The electrodes are then connected to the generating dynamo, and a current density of about 15 amperes per square foot of anode surface is maintained. Upon the passage of such a current between the electrodes through the bath the white lead begins to fall very rapidly. As the carbon dioxide is taken up from the bath to form the hydrated carbonate of lead, it is, of course, necessary to have the bath replenished with additional carbon dioxide as the process continues. This can be done in several ways. A convenient way in doing this consists in burning limestone, washing the gas produced by the dissociation of the constituents of the limestone, and supplying the gas directly to the bath.

Where the electrolytic solution is made up of sodium and ammonium nitrates in water, and the solution is saturated with carbon dioxide in its free state, the reactions taking place upon the passage of the electric current, according to the inventor, ore as follows: The bath is decomposed, yielding at the anode nitrogen pentoxide, ozone, and oxygen, and at the cathode sodium hydrate, ammonia, and hydrogen. The lead is attacked by the powerfully-oxidizing nitrogen pentoxide (N_2O_5) and ozone; but nitrogen pentoxide in the presence of water is decomposed and forms nitric acid (HNO_3). During the double decomposition which takes place nitric acid (HNO_3) and plumbic acid or hydroxide of lead, $PbO(OH)_2$, are formed. The nitric acid combines with the free ammonia and sodium hydrate to again form sodium and ammonium nitrate, while the plumbic acid is precipitated by the free carbon dioxide present and forms finally the hydrated carbonate of lead, $2PbO, CO_2 + Pb(OH_2)$. Thus it is seen that although the solution is decomposed by electrolysis, it is regenerated by the chemical reactions taking place, and the only loss sustained is carbon dioxide and water, which can be readily supplied.

The white lead is from time to time removed from the tank, washed,

and dried, and on mixing with a suitable vehicle into a paint it is found to have much greater covering properties than ordinary commercial white lead formed by dissolving lead in acetic acid in the presence of carbonic acid, since the latter is slightly crystalline and less opaque than the hydrated carbonate produced by the action of carbonic acid on plumbic.

Lead is dissolved at the rate of 59.52 grains per ampère hour, and if the dissolved lead is caused to combine with some element before deposition takes place it will add to its own weight that of the element. Thus lead in combining with water and carbon dioxide gains 19.88 per cent., or nearly 20 per cent. Hence one ampère hour forms 71.35 grains of pure white lead. The counter electromotive force of the white lead bath is from $\frac{99}{100}$ to $\frac{1}{2}$ volt, so that the $\frac{1}{2}$ volt is required to operate one tank; one watt hour will then deposit or form 142.7 grains of white lead, or 15.2 pounds per horse-power hour, or 152 pounds a day per horse-power, or $27\frac{1}{2}$ tons per year. Figuring power at $55 a year, 50 cents a ton for the electric current would cover the making of white lead. The cost of the water entering in combination is nil, and that of the carbon dioxide also, because 575 pounds of lime rock evolve 230 pounds of the gas at a cost of 100 pounds of hard coal, leaving a by-product of 345 pounds of quick lime, which more than pays for the coal; while the 230 pounds of gas just make one ton of white lead, 170 pounds of water also entering into combination with 1,600 pounds of lead to form 2,000 pounds, or one ton.

The inventor has favored us with a specimen of this interesting product, which is in an extremely fine state of division, the result of a simple drying by spontaneous evaporation, in marked contrast to the white lead obtained by the old acetic acid process, which has to be ground mechanically before it can be used.

SCHEME FOR ANALYSIS OF SMELTING ORES.

Written for the "Engineering and Mining Journal" by Geo. T. Dougherty, Chemist, St. Louis Smelting and Refining Company.

I do not remember having seen anything published on this subject, though there has been any number of articles describing the special methods of determining metals individually and singly. In this article I undertake to show how copper, iron, lime, zinc and silica, and also, if required, lead and antimony, may be expeditiously and accurately estimated in only two portions of a sample of ore weighed off (one gram each).

In one portion the determination of silica, lime and antimony is made; in the other, lead, copper, iron and zinc.

For silica and lime, dissolve the substance in nitric and hydrochloric acids in a porcelain dish; evaporate to dryness, redissolve in hydrochloric acid, dilute a little, and filter, washing with hot water. Reserve this filtrate for lime. Wash out the last traces of lead chloride on the filter with a hot solution of ammonium acetate once, and thrice with hot water. Reject these last washings containing only lead chloride, and burn the filter containing silica in a porcelain crucible in a muffle. Make the first filtrate from silica alkaline with ammonia, stir and let settle a little, to see if the clear liquid has a blue color due to the presence of copper. If colorless there is probably no copper, or any way under 0·2 or 0·3 per cent. Whether copper is present or not, add to the alkaline fluid 10 or 20 c. c. of yellow ammonium sulphide, enough to make the whole liquid look yellow after mixing and settling; let it stand for about 15 minutes (a much longer time is not desirable, for the ammonium sulphide has a tendency to absorb carbon dioxide from the air when exposed to it some time, and thus precipitate some of the lime present, which would be a loss when filtered). Filter out the sulphides of lead, iron and zinc and aluminum hydroxide, and wash with lukewarm water containing a few drops of ammonium sulphide each time, and throw away the filter with that precipitate. Acidify the filtrate with hydrochloric acid, boil hard for an hour, or evaporate down to little more than one-half its bulk, and filter off antimony sulphide and free sulphur. There the antimony may be estimated in the usual manner, if wanted. Add ammonia in excess to the filtrate, boil, add a sufficient quantity of ammonium oxalate solution, boil again for five or ten minutes, let settle and filter, washing with hot water. Transfer, by washing with hot water and then with hot dilute sulphuric acid from the wash bottles, the precipitate off from the filter unfolded and spread along the upper inside of the beaker, into the same beaker; dilute with 300 or 400 c. c. of water, add 5 to 10 c. c. of concentrated sulphuric acid, and titrate hot with potassium permanganate solution $\frac{1}{4}$ titre of iron = titre of line.

I almost hesitate to assert what seems to myself to be an actual fact from my own experience that the determination of lime in a solution containing much acetate of sodium or ammonium is apt to give too high results. I have adopted this ammonium sulphide method for lime as rather safer as well as much quicker than separating iron and alumina as basic acetates, and manganese as binoxide by bromine, and zinc with H_2S, and determinining lime in the final filtrate. The ammonium sulphide used must not be too old, as it is liable to contain some carbonate of ammonia.

For lead, copper, iron and zinc treat the other portion of the ore with nitric acid in a No. 1 Griffin beaker; heat gently until nitrous fumes are driven off, add some hydrochloric acid and boil. Let cool a little, add three or four c. c. of sulphuric acid, put in a triangle of glass rod (made by bending over a gas or alcohol flame) between the beaker and cover, and evaporate to dense fumes of the last acid. Cool and dilute with 150 to 200 c. c. of water, boil and filter after settling for about 15 or 30 minutes. Before boiling as above, put in a little pinch of common salt to precipitate the silver present. The filter contains silica and sulphates of lead and lime, while the filtrate has all the copper, iron and zinc. If the percentage of lead is wanted, the sulphates may be decomposed in a strong solution of sodium bi-carbonate at a gentle heat for an hour. Wash the mixed lead and lime carbonates twice by decantation, and then in the usual manner on the filter. Dissolve them out in hot diluted acetic acid into a separate beaker, and determine the lead by precipitating with potassium bichromate and drying on a tared filter. $PbCrO_4 \times 0.64 = Pb$. This is more reliable than the sulphuric acid modification described by Dr. Percy and used at Bleiberg, in Germany; as in the latter some lime is apt to be precipitated along with lead. Or, the lead can be titrated directly in this acetic acid solution with potassium ferro-cyanide solution, using uranium acetate as the external indicator, which is much more certain than ferric chloride, as proposed by the German originator of this volumetric process. This is by far the best and most accurate volumetric method yet known for lead. The strength of the potassium ferro-cyanide solution should be nearly one-fifth of that used for zinc titrations, and is standardized by lead nitrate, whose amount of lead has been previously determined by potassium bichromate or sulphuric acid. Even Merck's make of this salt labeled "C. P." has considerably less than the theoretical percentage of lead. Ammonium acetate is inadmissible as a solvent for lead sulphate in this volumetric process, as it affects the titration disastrously.

Add a few drops of hydrochloric acid to the filtrate from silica and lead sulphate, heat nearly to boiling, pass a quick stream of H_2S gas for about 15 minutes, filter and wash. Burn the moist filter which contains copper sulphide, in an open porcelain crucible at a low, red heat, best at the mouth of a muffle. If there is much copper, fold the filter in another filter, so that after roasted it may be easily tapped and brushed off into a No. 2 or 3 common tall beaker, put in 5 c. c. nitric acid and cover, heat until nitrous fumes are nearly or quite expelled. Cool and add 10 c. c. ammonia, and titrate with potassium cyanide, shaking the beaker around under the burette. The potassium cyanide solution must be standardized under the same conditions as to the amounts of nitric acid and ammonia used, etc.

To those who object to the offensive odor of H_2S gas, which sometimes laughs at modern inventions like the stink or ventilating hood and diffuses itself throughout the whole building to the intense disgust of other persons employed therein—to those who would avoid all this, I recommend the use of sodium hyposulphite for precipitating copper at this stage of the process. Instead of adding a few drops of hydrochloric acid as for use with H_2S gas, add a little more sulphuric acid, bring up to a boiling heat, put in at first a minute crystal of sodium hyposulphite and then at once the rest of the quantity which must be sufficient, so that after boiling again for 15 minutes, the liquid will be quite colorless. Abont three or four grams usually suffice. Treat the copper subsulphide on the filter in the same manner as above for the precipitate with H_2S, so that it may be brought into solution for titration with potassium cyanide. This modification with either H_2S or sodium hyposulphite for copper is just as accurate as the standard method of precipitating with zinc and redissolving in nitric acid and ammonia for titration with potassium cyanide, and has the advantage of being more handy and rapid.

Add a little hydrochloric acid and a sufficient quantity of potassium chlorate, but not too much, to the filtrate from copper sulphide or subsulphide in a No. 5 common beaker and boil hard. It is not quite necessary that the liquid should become perfectly clear and free of white particles of sulphur, if it is judged by the yellow color of the solution that all the iron has been oxidized. If too much potassium chlorate has been used the boiling solution will smell strongly of chlorine. In order to get rid of this, which will exert rather injurious influences upon the subsequent titration for zinc, evaporate down to one-third or one-fourth of its bulk, or less if necessary. With practice, one will not be apt to add more than a proper quantity of that powerful oxidizer. I would warn those who may presume that nitric acid would do instead of potassium chlorate that excess of nitric acid is nearly as bad as excess of chlorine in its effect on the titration for zinc; and, unlike the latter, it cannot be so easily got rid of, and, even after converting into a nitrate with ammonia, is still more or less injurious. The H_2S filtrate is much more easily oxidized or takes up much less chlorate than that with sodium hyposulphite, I, therefore, prefer to use H_2S whenever in a great hurry.

Almost, but not quite, neutralize the iron and zinc solution with ammonia, add a proper quantity of ammonium chloride—about as much in the aggregate as is used in standardizing the potass ferro-cyanide solution for zinc; cool by standing in a large vessel or dish of cold water, add a few drops of bromine water if there is already left not quite a trace of chlorine, which would do to oxidize the manganese, and pour in 20 c. c. ammonia, stir and let settle for 10 or 15 minutes. Filter and wash with cold water. If the filtrate is perfectly clear it is free of manganese, all of which has been precipitated as binoxide, together with ferric oxide and alumina. But should the filtrate be not quite clear, but growing turbid or cloudy (brownish), as is sometimes the case when much manganese is present, add a few more drops of bromine water, stir and let stand, say an hour, and the liquid, when filtered, will then be clear. Dissolve the iron oxide on the fiiter in hot dilute hydrochloric acid into the same No. 5 beaker. In the case of much binoxide of manganese on the filter, add a few deops of Stannon's chloride solution to the dilute, hydrochloric acid to accelerate the re-solution. Reduce the iron oxide in this solution with a strong solution of Stannon's chloride (100 grams in 325 c. c. hydrochloric acid and 675 c. c. water) added cautiously and in small portions at intervals until colorless, and still a few more drops added; cool, and, while stirring, pour in all at once 30 c. c. of mercuric chlorite solution (60 grams in one liter of water) and stir again. Titrate, with potassium bichromate. The precipitate caused by mercuric chloride should be white; if at all dark, too much Stannon's chloride has been used, and in consequence, not all the excess of it has been precipitated by that prescribed quantity of mercuric chloride solution, and therefore the operation for iron determination is utterly spoiled. Wiih practice this mistake need not be repeated. This method is quite reliable and satisfactory, and is fast getting popularity with iron and steel chemists. This can be performed in a direct solution of the ore itself in hydrocloric acid, and I have in this way made hundreds of iron determinations on Iron Mountain and Pilot Knob ores checking very well those certified to by the firm of Rattle & Nye, well-known chemists of Cleveland.

Lastly, the filtrate from the hydroxides of iron alumina and manganese dioxide is acidified with hydrochloric acid and titrated for zinc with potassium ferro-cyanide solution, using uranium acetate as the indicator. After a little practice, one, by noting the appearance of the liquid while stirring with a glass rod, knows how he is approaching the end reaction, and thus does the titration very rapidly. Except for very low zinc, when very near the end of the operation, the whole liquid will appear to be quite full of the white precipitate; that is, one cannot see all through the top or edge of the liquid along the opposite side of the beaker; and also, when zinc is high, toward the end the mass may show a slightly bottle-green color in the center when stirred. The lead titration with potassium ferro-cyanide solution has not this advantage of indicating the

progress of the work, and so the operator has to be a little more cautious and gradual in adding from the burette.

The above scheme of analysis applies to nearly all kinds of smelting ores except feld-spathic and baryta ores. The former have to be fused, so as to get the silica free of alumina, etc. Baryta ores, after treatment with nitric and hydrochloric acids, are converted into sulphates by evaporation with sulphuric acid, and the insoluble sulphates of baryta, lead and lime filtered off and treated with ammonia carbonate solution in the cold for twelve hours, with occasional stirring. Filter and wash. Lead and lime will be present as carbonates, while barium, sulphate and silica remain unaltered. Dissolve out the lead and lime in hot dilute acetic acid and separate these by H_2S. Burn the filter now containing barium, sulphate and silica, and weigh as such. Fuse with mixed carbonates of soda and potassa, extract with hot water, filter and wash. Dissolve out the barium carbonate on the filter in hot dilute hydrochlorlc acid, and determine baryta in this solution with dilute sulphuric acid. Deduct this last weight (as barium sulphate) from the first (barium sulphate + silica), and the difference is silica.

Manganese and arsenic, which are not very frequently required, are best determined in separate portions of the ore; the former by Volhard's process, which involves the use of zinc oxide and titration with potassium permanganate, and the latter by Pearce's.

For silica, lime, copper, iron and zinc, by the above plan, I can easily start and finish two or three samples of ores within eight hours. It will be noticed that all of these are estimated volumetrically except silica. If the total absence of copper is conclusively known the work may be considerably shortened by omitting the treatment with sulphuretted hydrogen or sodium hyposulphite, and subsequently with potassium chlorate. I have seen it suggested somewhere by Prof. Hand, of Denver University, that aluminum foil can be used to separate copper from zinc in a hydrochloric acid solution, after precipitating iron by ammonia. It is impossible, or very difficult, to get iron-free aluminum cheap enough, and another possible objection is that the iron precipitate may retain more or less of the copper. However, when chemically pure aluminum becomes easily obtainable, it will be exceedingly handy when the determination of zinc alone is wanted.

For several points in this article I am indebted to our superintendent, W. L. Hoyt, himself a practical and accomplished chemist. I shall be pleased if other chemists, from their own knowledge or experience, can make any suggestion which may improve this scheme, either in accuracy or expedition.

ST. LOUIS, January, 1890.

German Pig Iron Production for 1889.—The following statistics for December have been issued by the Pig Iron Union: Stock from November, 32,564 tons, production, 127,923 tons, deliveries, 62,800 tons, consumption, 66,391 tons; stocks, 31,296 tons, contracts, 426,715 tons. Total production in 1889, 1,420,755 tons against 1,377,537 tons in 1888.—*Kuhlow.*

Testing the Forth Bridge.—The Forth Bridge was tested on January 21st, under the superintendence of Sir John Fowler, Mr. Benjamin Baker, Mr. Arrol, and Mr. Stuart, the engineer who made the mathematical calculation in connection with the bridge. The official report issued on the results obtained is as follows: "Sir John Fowler and Mr. Baker, engineers of the Forth Bridge, have to-day tested the two 1,700-foot spans by placing on the centres two trains, each made up of fifty loaded coal wagons and three of the heaviest engines and tenders, the total load thus massed upon the spans being the enormous weight of 1,800 tons, which is more than double what the bridge will ever be called upon in practice to sustain. The observed deflections were in exact accordance with the calculations of the engineers, and the bridge exhibited exceptional stiffness in all directions. It may be interesting to record as further testimony of the strength of the Forth Bridge that during the recent heavy gale, when the wind gauges on Inchgarvie recorded a pressure of 37 pounds per square foot, the maximum lateral movement of the great cantilever was less than one inch."

Electrical Furnaces.—This invention by R. E. B. Crompton relates to that class of smelting furnaces in which the heating effect is obtained by the passage of an electric current, and the improvement consists of the application of some other source of heat for the purpose of preliminarily raising the temperature before the electric current is turned on. For this purpose a Siemens gas generator may be employed, and the gas thus generated is mixed with air in such proportions that a non-oxidizing flame is produced. The gas is conducted to the furnace through a series of tuyeres, which may be arranged so as to project either through the bottom of the furnace to a sufficient height to prevent them being blocked by the metal, or through the sides or ends of the furnace. The gas may, however, be introduced through movable jets projecting through the cover of the furnace. When it is desirable that the gas should be carried well among the material in the furnace, temporary nozzles are provided. These are made of some material which, if melted, will not injure the contents of the furnace. The heating of the material can also be effected by providing separate chambers at the two extremities of the furnace and annular chambers round the carbon electrodes. The gases are conducted to these chambers and allowed to burn there. The gases, when not burning, are of low enough temperature not to injure the parts of the carbon electrodes over which they pass.

A Large Phosphor-Bronze Casting.—Messrs. Steven & Struthers, brassfounders, Glasgow, have successfully completed the first of several phosphor-bronze castings, which are interesting in view of their size and weight. It was decided by the Admiralty to have several of the second-class cruisers recently ordered wood-sheathed and copper-bottomed. As the copper would result in the corrosion of steel by galvanic action, it is necessary to make the stem and sternposts of phosphor-bronze. The stem of one of the vessels has been completed. It weighs over 10 tons, and from the connection with the built keel to the point of the ram the measurement of 23 feet 6 inches, while the height from the ram to the top of the stem is 20 feet, making the length from tip to tip 43 feet 6 inches. The stiffening bracket in connection with the ram forms part of the casting, and is not, as is usually the case, separate and bolted to the stem. At its broadest part the stem is 3 feet, and is scarfed for the steel plates and teak planking. The principal casting of the stern framing, the first of which is now in progress, will weigh 12 tons 5 cwt. To it are fixed two brackets for the propeller shafting tubes, each bracket being 4 tons 10 cwt.; while the rudder, on the balance principle, will be 10 tons, making in all 31 tons 5 cwt. The larger casting in connection with the stern-post measures from point to point 35 feet 6 inches. The rudder is cast in frame, and plated with bronze sheeting ⅝ inch thick. It may be added that the metal is composed of 90 per cent. copper, 9.5 per cent tin and .5 per cent. phosphor. The castings for each ship will cost about £2,200.

Improvements of the Electrolytic Production of Metals.—C. Hoepfner, Berlin, Germany, has recently taken out a patent that relates principally to copper, and depends on the fact that while hitherto copper has been reduced from ores and matte, and refined from the crude metal by the electrolysis of solutions which contain its salts in the cupric state, it is now proposed to use them in the cuprous condition, thereby economizing the energy necessary. The process is carried out as follows: Chlorinated, roasted, waste ores are extracted with a strong solution of common salt, and the cupric chloride thus obtained reduced by any suitable means, such as sulphurous acid or ores containing metallic sulphides. Impurities, such as tin and arsenic, are precipitated by adding "sulphur compounds of the alkalis or oxides or carbonates of the alkalis, either in solid or liquid form;" and the precious metals are precipitated by iron or copper or by electrolysis. The purified solution of cuprous chloride is electrolyzed with carbon electrodes, and yields 40 kilograms of copper per horse power in 24 hours. At the anode, which is separated from the cathode by means of a parchment membrane, cupric chloride is produced, and is converted into cuprous chloride by the use of the reducing agents mentioned above, which may be used either within or without the decomposing vessel. If the ores to be treated contain gold, it is necessary to push the action at the anode further than is generally necessary, viz., until the liquid there contains free chlorine.

During the lixiviation of the ore, and afterwards during electrolysis, the solution is preferably agitated, and for this purpose gases containing no free oxygen should be used. Gases containing carbonic oxide are said to be best, because of the fact that the union of this constituent with the cuprous chloride aids the depolarization of the electrodes.

Copper ores containing silver, or silver ores themselves, may be treated by the process, the silver being dissolved as chloride in the highly-chlorinated liquid at the anode, and precipitated from this solution by electrolytic or chemical means.

The same occurs with lead, using hot solutions, save that no special process for its precipitation is necessary, as it precipitates spontaneously on cooling.

The patentee claims the use of the other two halogens as well as that of chlorine.—*Jour. Soc. Chem. Ind.*

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent Office.

FEBRUARY 4, 1890.

420,432. Method of Separating the Valuable Portions of the Tailings Produced in the Treatment of Ores. Robert E. Booraem, Butte, Mont.
420,438. Rail Chair. Henry F. Cox, Altoona, Pa.
430,442. Coal Drill. David Davis and James McComb, Buckingham, O.
420,453. Apparatus for Mixing Concrete. Nellie M. Hewes, Oak Park, Ill., administratrix of Lester W. Hewes, deceased.
420,459. Soldering Apparatus. George W. Melotte, Ithaca, N. Y.
420,477. Combined Packing and Lubricant. Columbus E. Thompson, Baltimore, Md.
420,485. Metallic Railway Cross-Tie and Rail Fastening. S. Lloyd Wiegand, Philadelphia, Pa.
420,487. Furnace-Roof. Henry Aiken, Homestead, Pa.
420,498. Rolling-Mill. Henry C. Kriete, Chicago, Ill.
420,500. Electric Drill. Imle E. Storey, Boulder, Colo.
420,534. Smoke Consuming Furnace. Wear L. Drake, Chicago, Ill., Assignor of one-half to Freeman Lane, same place.
420,539. Carbonizing Steel. Charles Jones, Derby, County of Derby, England.
420,540. Car-Coupling. Jonathan H. King and Benjamin F. Reed, Swan Creek, Ill.
420,561. Draw-Head for Railway Cars. Charles McAfee & Roger McAfee, Portland, Ore.
420,571. Crushing-Rolls. Charles G. Buchanan, New York, N. Y.
420,576. Machine for Straightening Angle Irons. Peter Heesom, Pittsburg, Pa.
420,593. Adjustable Support for Shafts. Everett E. Devoll, Verona, Wis.
420,598. Alloy. Edouard Golay, Geneva, Switzerland.
420,602. Sheet-Metal Crimping-Machine. Frank M. Leavitt, Brooklyn, N. Y., Assignor to the Vulcan Company, Philadelphia, Pa.
420,616. Expanding Lathe Mandrel. Lathan H. Brightman, Cleveland, Ohio.
420,624. Car Axle. Frederick J. Hoyt, Chicago, Ill.
420,626. Dynamite. Egbert Judson, San Francisco, Cal.
420,646. Casting. Robert C. Totten, Allegheny, Pa.
420,648. Insulating Compound. James B. Williams, San Francisco, Cal.
420,673. Car Coupling. Ferdinand Blauss, New York, N. Y., Assignor of one-half to George J. Schnatz, same place.
420,674. Railroad Tie and Chair. Isaac Brown, Swatara, Pa.
420,677. Hoisting Machine. Elijah Dainty, Coal Bluff, Pa.
420,678. Device for Transmitting Motion. John W. Eisenhuth, San Francisco, Cal.
420,689. Process of Removing Incrustation from Boiler Tubes. James P. Karr, Monticello, Ind.
420,693. Electro-Magnetic Car Brake. Daniel S. McElroy, New York, N. Y.
420,719. Apparatus for Subliming Sulphur. Charles Dubois, Marseilles, France.
420,750. Safety-Valve for Fuel-Gas Pipes. Charles Wahl, Dayton, O.
420,808. Shaft-Coupling. Frederick O. Landon, Bantam, Conn.
420,809. Car-Coupling. George G. Lane, Prosperity, S. C., Assignor of one-half to Robert L. Luther, same place.
420,827. Metal-Working Machine. Lewis Olsen and Nevin E. Burns, River Falls, Wis.
420,835. Apparatus for Recovering Alkali. George Seller, Spring Forge, Pa.
420,837. Process of Making Chlorine. Ernest Solvay, Brussels, Belgium, Assignor to the Solvay Process Company, Syracuse, N. Y.
420,878. Reheating Device for Compressed Air. Whitcomb L. Judson, Minneapolis, Minn., Assignor to the Judson Pneumatic Street Railway Company, same place.
420,888. Motor. Robert G. Ping, Audubon, Iowa.
420,895. Railroad Tie. Joseph B. Wilson, Woodbury, N. J., Assignor of one-half to Lewis M. Green, same place.
420,897. Coke-Oven. William W. Anderson, Wilkinsburg, Pa., Assignor of one-half to James H. Curry, same place.
420,906. Apparatus for Charging and Discharging Secondary Batteries. Warren S. Johnson, Whitewater, Assignor of one-half to William Plankinton, Milwaukee, Wis.
420,911. Lubricator. William P. Miller, Brooklyn, N. Y., Assignor to the William P. Miller Company, same place.
420,923. Car-Coupling. William W. Townsend, Sr., Minneapolis, Minn.

REISSUES.

11,058. Mining-Machine. Edwin E. Carter, Pittsburg, Pa., Assignor to John S. Scully, same place.

PERSONALS.

Capt. F. W. Voll, the veteran mining man, has returned to San Francisco after a long absence in Arizona.

Mr. Arthur Macy, Mining and Civil Engineer, of New York, has gone to the Pocahontas Coal Field, Virginia, on professional business.

Mr. William Warren, of London, England, is now in China to inspect and report on the mineral resources of China, Borneo and Japan.

Mr. Charles L. Perkins, an old-time resident of Nevada, has been appointed secretary of the Belcher Mining Company, of the Comstock lode, Nevada.

Mr. Bradstreet, of New York, has been elected president of the Phœnix Mining Company, of Arizona, and will go the mines to superintend the company's affairs.

Mr. John E. Rothwell, Mining Engineer, of Ontario, Can., has gone to Deadwood, South Dakota, where he takes charge of the chlorination department of a gold mill.

The President has consented to open the Public Library and Art Gallery buildings, presented by Andrew Carnegie to the city of Allegheny, Pa. The ceremony will take place on February 11th.

Mr. R. S. Oberholser, late first assistant at the Laughlin and Junction Steel Company, of Mingo Junction, Ohio, has accepted the position of Chief Chemist to the Valley Steel Company, of St. Louis, Mo.

Mr. Frederick A. Sheffler, formerly superintendent and general manager of the Erie City Iron Works, of Erie, Pa., has accepted the position of acting-general superintendent of the Westinghouse Electric Company, of Pittsburg, Pa.

Mr. V. H. Rood, formerly chief draughtsman of the Barr Pumping Engine Company, of Philadelphia, Pa , has accepted the position of superintendent of the Jeanesville Iron Works, J. C Haydon & Co., located at Jeanesville, Lucerne County, Pa. The change took effect on Feb. 1st.

Mr. Henry F. Collins, late chief of the Naya Department of the Rio Tinto mines, and Mr. George Ernest Collins, who has for some time managed the London office of Messrs. J. H. Collins & Sons, mining and metallurgical engineers, of London, England, have been admitted as partners in the above firm.

Messrs. Phillips & Claghorn, engineers, chemists and assayers, of Birmingham, Ala., have dissolved partnership. Prof. Wm. B. Phillips has purchased Mr. Claghorn's interest in the firm and will hereafter conduct the business on his own account, and Mr. R. Claghorn will devote his time exclusively to the coal business and to the Coal City Coal and Coke Company, of Birmingham, of which he is General Manager.

Major W. H. H. Beauregard, Major Heuer and Major J. W. Powell, the commissioners appointed by the Federal Government to investigate the effect of debris from hydraulic mining on the navigable streams of the State, and the Sacremento in particular, have finished their report, which will be made public in a short time. It is reported that the Commission has been convinced that the filling up of the Sacramento cannot be attributed to an overflow of debris from the mines, but is entirely due to natural causes.

Mr. John H. Inman, ex-president of the Tennessee Coal, Iron and Railroad Company, filed this week, in the United States Circuit Court, his answer to the complaint in the suit of equity, to recover about $2,000,000 brought by Thomas C. Platt, president, and the present board of directors of the company, to which reference was made editorially in the ENGINEERING AND MINING JOURNAL of December 14th, Mr. Inman's answer is signed by John E. Parsons and ex-Governor Hoadley, Patrick Calhoun and Edward Baxter of counsel. Mr. Inman denies specifically all the charges made against him.

The first annual meeting of the Federated Institution of Mining Engineers was held last month at Sheffield, England. The federation combines four previously existing organizations, viz., the North of England Institute of Mining and Mechanical Engineers, the Chesterfield and Midland Counties Institution of Engineers, the Midland Institute of Mining, Civil, and Mechanical Engineers, and the South Staffordshire and East Worcestershire Institute. A preliminary meeting of the council was held, under the chairmanship of the president, Mr. John Morley, New Castle-on-Tyne. The sitting was chiefly occupied with the consideration of rules and administrative details. It was followed by the general meeting of members, at which Mr. Morley again presided. The president's inaugural address dealt chiefly with the advantages accruing from a system of federation which at the same time retained the individuality of the several federated organizations. It was followed by the reading of three papers, one on "Coal-cutting Machines," by Mr. G. Blake-Walker; one on "The Geology of the Southern Portion of the Yorkshire Coalfields," by Mr. R. Russell; and a third on "The Distribution of Energy over Large Areas of Mines by Electricity," by Mr. A. T. Snell.

As already announced, the 56th meeting of the American Institute of Mining Engineers will be held at Washington, D. C., beginning on Tuesday evening, February 18th. The hotel headquarters for members will be at the Arlington. The programme of proceedings will be as follows:

Tuesday Evening, February 18th.—Opening session at 8 P. M., at the United States National Museum. At the close of this session opportunity will be given for an informal social reunion, and for the inspection of the National Museum.

Wednesday, February 19th.—Excursion to Mount Vernon. A session will be held, and lunch served during the excursion.

In the evening a session will be held at the Arlington.

Thursday, February 20th.—In the morning a visit will be made to the Navy Yard, where the new government works for the manufacture of heavy ordnance will be inspected. Interesting operations connected with this manufacture will be performed during this visit.

In the afternoon the Institute will be received by the President of the United States, after which there will be an opportunity to visit public buildings and points of local interest.

In the evening a subscription banquet will take place at the Arlington.

Friday, February 21st.—Sessions in the morning and afternoon, at or near the Arlington. During the morning session papers on the manufacture, properties and uses of aluminum will be presented and discussed. At the afternoon session the annual report of the council will be presented, and the result of the election of officers will be announced.

In the evening some social receptions will be offered by citizens of Washington.

On Saturday morning those members who desire to inspect the gold mining operations in Montgomery County, Md. (reached by a drive of some 15 miles across country from Washington), will be provided with transportation for that purpose.

Mr. F. P. Dewey, 606 Eleventh street, N. W., is the secretary of the local committee.

INDUSTRIAL NOTES.

The Rome Iron Company has broken ground for a charcoal furnace at Rome, Ga.

The Delaware & Hudson Canal Company have under contract 15 locomotives and 450 freight car.

The furnace of the Gadsden Iron Company, at Gadsden, Ala., has blown in, after making repairs.

The Bibb Furnace, at Briarfield, Ala., will go into blast about March 1 on charcoal car-wheel iron.

The Bengal Iron and Steel Company has been started in India for making iron and steel, with a capital of £150,000.

The Knoxville Iron Works, at Knoxville, Tenn., are reported to have in contemplation the restarting of their nail mill.

It is reported that Andew Carnegie is surveying for a road 50 miles in length from the H. C. Frick Coke region through Verona, with the object of controlling the Western trade.

The Proton Furnace, at Cleveland, leased by Pickands, Mather & Co., will go into blast on Bessemer iron about the 15th of February.

The second furnace of the Pioneer Mining and Manufacturing Company, at Thomas, near Birmingham, Ala., has gone into blast. No. 1 during 1889 made 41,272 tons of pig iron.

One of the stacks of the Coplay Iron Company, at Coplay, Pa., is undergoing repairs, and is being to a large extent modernized. It will be one of the largest furnaces in the Lehigh Valley.

The Longdale Iron Company, at Longdale, Va., has purchased from the heirs of the late C. R. Mason, for $40,000, the Big Hill iron ore property near Galawater, on the Richmond & Alleghany Railroad.

A large number of electric drills have been introduced in the coal mines of the Hercules Company, in Pennsylvania, reducing, it is claimed, the cost of mining to less than one cent a bushel. The Tesla motors are employed.

The final sessions of the Stove Manufacturers Association were held in Chicago, Ill., this week. The next meeting will be held in Philadelphia next May. D. H. Thomas was elected president, Thomas Hogan, of Troy, secretary, and S. T. Peckham, treasurer. The secretary's salary was reduced from five to three thousand dollars, and his expenses from five to three thousand.

The Pennsylvania Railroad Company has given a contract for a large amount of dredging preparatory to the increasing of the ore handling facilities at Erie, Pa., which will treble the receipts of that commodity at that place. The extensions will cost fully $750,000, and will enable the company to handle 1,000,000 tons of ore a year. The company has already extended its yards preparatory to the more important outlay.

The Douglas Axe Works, at Milford, Pa., which were recently sold, were purchased by Messrs. Mann and Hubbard, of Pennsylvania, and Bixby, of Nashua, N. H. The works hereafter will be known as the Douglas Branch of the American Axe and Tool Company. A part of the works started up on the 6th inst., and by next week, it is expected, all of the works will be running. The price paid for the plant, it is stated, was $150,000.

The Canada Atlantic Railroad steel bridge over the St. Lawrence at Coteau Landing, Montreal, is now all but completed, and next week freight trains will make initial trips over the whole work. It will then have occupied ten months and ten days in construction. There are 17 fixed spans—one of 139 feet, two of 175 feet, ten of 217 feet, and four of 223 feet each—while the swing bridge covers 355 feet. The islands that intersect the bridge are Giroux Island, 905 feet, and Round Island, 1,220 feet. The whole structure is a mile and three-quarters in length.

The edged-tool manufacturers of the country met in Pittsburg, Pa., on the 5th inst., and formed a combination. Among the firms represented were Hubbard & Co., of Pittsburg; the Douglas Axe Works, of Douglas, Mass.; The Powell Tool Company, Cleveland, Ohio; Carpenter & Co., Jamestown, N. Y.; the Nashua Tool Company, Nashua, N. H.; Rhomer Brothers, New York; Knickerbocker & Co., Ralston, N. Y., and six or seven other factories. The name of the new organization will be the American Axe Company. In perfecting this organization there is embodied all and more than existed in the old agreement, which is well understood by dealers. The concerns, it is claimed, represent $5,000,000 capital.

The first report of the Nicaragua Maritime Canal Company has been sent to the Senate this week in accordance with the provisions of the act of Congress incorporating the company. The report says that the company has completed the axial surveys and final plans of the proposed interoceanic canal, and that they have been approved by the Government of Nicaragua. On June 3d, 1889, the preliminary work of construction was begun, and on October 8th excavation was begun. Permanent headquarters have been established at Greytown, buildings erected, railroad and other works constructed, and a large store of machinery and materials collected. Of the capital stock 10,145 shares have been subscribed at par, and $601,450 paid in. Since June 3d $500,000 has been expended upon the work in Nicaragua.

The representatives of the mineral oil trade of Scotland recently met in Glasgow to consider matters relative to the future arrangement with the American Oil Combination. The present arrangement expires at the end of March, and the American representatives wish to maintain present prices for solid paraffin; while Scottish producers wish to increase prices 1d. per pound, to meet the increased cost of fuel and the advance in wages of miners. It is also understood that the American representatives wish to increase their restricted export to England 4,000 tons, which also is opposed. Owing to the differences of opinion as to the position the Scottish companies should take up, the proposed committee to meet the American representatives in London was not appointed.

The Ingersoll-Sergeant Rock Drill Company, of New York, has issued a circular to its employés from which we extract the following: "The statement was made to you last spring that it was the intention of this company to divide among its employés at the end of the year a part of its net earnings for the year, the amount to be so divided to depend upon the amount of such net earnings. We are prepared to pay in cash to each one of you upon the first day of February the amount to which he may be entitled. But as it is our intention to divide among all our employés who are regularly in our employ on the first day of February, 1890, and remain so until the thirty-first day of December, 1890, a part of our net earnings for the year 1890, to be so divided to depend (as it has this past year) upon the amount of such net earnings—we have a proposition to make to you: To all who may so desire we will give, in the place of cash for the amount coming to them, a certificate representing such amount, bearing interest at the rate of six per cent. per annum, payable to the person entitled to it, personally on the first day of February, 1891, and all such as may elect to take such certificates instead of cash for the amount coming to them, shall receive out of the net earnings of 1890 a sum one-fourth larger than those who elect to take cash."

Govenor Jackson of Maryland has sent a specia message to the Legislature of that State, recom

mending that an offer made by the Washington and Cumberland company to lease the Chesapeake & Ohio Canal be accepted. This company was incorporated on the 4th inst, and made the only bid asked for by the Board of Public Works.

The railroad proposes to lease the canal and all its lands and franchises for 99 years. They will build their tracks on the towpath or bed of the canal from Cumberland to Washington. The company agrees to take up the repair bonds, to pay claims for labor of $70,000 against the canal, and meet $30,000 worth of judgments and pay 25 per cent. to the preferred bonds of 1844. The entire payments promised foot up $1,400,000. The lease is also to contain a provision for making contracts and connections with the Western Maryland and other roads, and to contain a provision that the Washington & Cumberland road is not to be leased to the Baltimore & Ohio. The road, when completed, is to pay the State $15,000 annually. The governor says that as a waterway the canal is a failure, while as a railroad it will be a paying piece of property to the State, and a great benefit to the counties of Alleghany, Washington, Frederick and Montgomery. He thinks the proposition to appoint a a receiver to operate the canal not at all feasible.

At the annual meeting of the stockholders of the National Lead Trust, on the 5th inst., it was decided on the proposition of the President, W. P. Thompson, to reduce the capital stock two-thirds.

The capital was announced to be at present $89,437,000. The following were elected trustees for three years: W. P. Thompson, A. T. Goshorn, and S. R. Bradley. To fill vacancies and to hold office until February, 1891: F. W. Rockwell, W.H. Thompson and R. R. Colgate. The three whose terms of office have not expired are S. Y. Beymer, B. B. Shipman and A. P. Thompson.

The president's report covers the operations of the trust from its organization, Oct. 1, 1887 to Jan. 1, 1890. It tells of the disastrous competition under which the various companies labored prior to the formation of the trust, and even after the formation. Up to Jan. 1, 1889, no money was made, the aggregate loss being $283,600 In May, 1889, however, the trust began to secure desirable results, and now contains a majority of the stock of 31 companies, among them three large smelters, one of the most complete refineries in the world for pig lead, and three linseed oil mills, while the rest of the companies manufacture white lead. oxides, pipe, and sheet-lead machinery. In the year 1889, 77,010 tons were manufactured, and the works can manufacture 97,000 tons. In the first six months of 1889 the trust made $309,848, and in the last six months of 1889 the net profit was $792,173.

The value of the properties in the trust is $22,361,900, capitalized at the rate of four for one. The actual cash assets of all the companies above all liabilities is $5,594,189. The percentage of the production outside of the trust is 4 per cent.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

553. Boiler, 100 horse power. Maryland.

554. Ice machinery. Sealed bids and specifications for a six-ton ice factory delivered and set up in Kentucky. Specifications and bids must be in by February 10th. Kentucky.

555. Electric light machinery. Sealed bids and specifications for an incandescent electric light plant that will furnish 100 lights, 30 candle power. Kentucky.

556. Stone quarrying machinery supplies. Colorado.

557. Patent lime kilns. Colorado.

558. Well sinking machinery. Colorado.

559. Oil fuel burners. Colorado.

560. Rock pulverizers. Colorado.

561. Gas-holder of 100,000 cubic feet capacity, single or double lift; bids for holder and tank complete. Virginia.

562. Excelsior Machinery. A machine of the very latest improved type to manufacture excelsior, capacity from four to six tons per day; also a machine for pressing the same in 100-pound bales. Virginia.

563 Steam heating apparatus, roofing, school furniture, etc., circulars describing the same. Arkansas.

564. Engines, six or eight horse power. Tennesses.

565. Ice machine, with a capacity of two tons per 24 hours. Kentucky.

578. Boiler, engine, saw-mill and planing machinery. North Carolina.

579. Dummy engine, second hand; size about 12 × 18, and with only four drivers. New Jersey.

580. Wood-working machinery. Small saw mill, cut-off saw, box slat saws, hub and spoke machinery. Virginia.

581. Ice machine. Kentucky.

582. Electric lighting machinery. Kentucky.

583. Fire-clay retorts for use in the manufacture of coal gas. Pennsylvania.

584. Electric light plant. Kentucky.

585. Roofing. North Carolina.

586. Machinery for manufacturing tubs and pails. North Carolina.

587. Shafting, hangers, pulleys, etc. North Carolina.

588. Engine and a small saw mill. North Carolina.

589. Patent coal wagons. New York.

590. Planer, beader and matcher combined in one machine. Mississippi.

591. Quartz mill called "The Developer." California.

592. Cast washers, ⅛ and ¾-inch hole. Pennsylvania.

AMERICAN GOODS WANTED ABROAD.

514. Agency wanted for mining and other machinery. South Africa.

550. Machinery for manufacturing corn meal. South America.

551. Kiln for drying corn; plan and estimate of same. South America.

552. A large quantity of coke monthly for smelting purposes in Venezuela, South America. Those in a position to fill the order can learn particulars by addressing this office.

566. Box shooks (Oregon or sugar pine not wanted); sizes of ends, sides, tops and bottoms on application. 1,000 boxes 18⅝x12x9½; 500 boxes, 19½x13½x10¼; 300 boxes, 21½x12½x9¼. Australia.

570. Boxes, 19x11¾x11½; quotations, per 1,000; boxes, 10x5x10, 11½x6x11½, 12x6½x12, 14½x6½x14½, quotations, per 100 gross lots. Australia.

573. Gas machines; catalogues and full particulars; agency if obtainable. Australia.

574. Machinery for making corn flour. Australia.

593. Agency for coal mining machinery. Westphalia, Germany.

GENERAL MINING NEWS.

The United Mine Workers' Convention at Columbus, Ohio, adopted a constitution, some of the provisions of which are: Coalfields are to be divided into divisions or districts, and a State union may be organized when one or more divisions exist, assigned as follows: District No. 1, anthracite region of Pennsylvania; 2, central Pennsylvania; 4, coke regions; 5, Pittsburg district; 6 to 10, Ohio; 11, Indiana; 12, Illinois; 13, Iowa; 14, Missouri and Kansas; 15, Colorado, Washington and the Territories; 16, Maryland; 17, West Virginia; 18, Virginia; 19, Tennessee and Kentucky; 20, Alabama and Georgia; 21, Texas, Arkansas and Indian Territory.

Divisions, districts, local unions or assemblies may adopt such by-laws as will not conflict with the constitution, said by-laws to be submitted to the National Executive Board for approval. An auditor is to be elected. Initiation fee to any branch of the union shall not be less that one dollar. Cards from either branch of this union shall be recognized by all the affiliated local unions and assemblies. That the executive board shall make provisions to join the American Federation of Labor and an equal amount of money shall be set aside for the extra expense.

The following officers were elected: President, John B. Rae, Pennsylvania; Vice-President, W. H. Turner, Ohio; Secretary-Treasurer, Robert Witchorn, Ohio; Auditor, J. H. Kennedy, Indiana; Executive Board, Patrick McBride, Pennsylvania; Wm. Scoife, Illinois; R. F. Warren (colored), Ohio; John Kane, Indiana; W. C. Webb, Kentucky.

Resolutions were reported and adopted favoring immediate enactment for the abolition of the company store system; that the safety of the miner is of the highest importance, and that the most improved machinery should be used for the protection of life, therefore indorsing the Shaw machine and recommending its adoption in all the mines of the country.

A resolution was adopted to enforce eight hours as a day's labor, beginning May 1st, 1890.

ROSS-HANNIBAL MINING COMPANY.—At a meeting of the directors held in Deadwood on the 27th ult., assessment No. 4, of one-half cent per share, was levied. The company proposes driving its tunnel another 100 feet, and sinking the old shaft to a considerably greater depth than it now has. During this work ore will be taken out and piled up ready for sale in the spring to local reduction works or smelters, or for shipment to Omaha and Kansas City. Operations have begun.

ARIZONA.

COCHISE COUNTY.

ARIVAKIA.—The purchase of this group of mines was made recently. Mr. G. W. Goddard, the purchaser, is of New York City. He was once, says the Tucson *Star*, largely interested in the Copper Queen mines. The mines are 24 in number. They are located about 60 miles north from Wilcox. There is a good road to within two and a half miles of the mines, and this distance can be overcome with an expenditure of about $3,000. It is the intention to have a 60-ton smelter running on or before next August. Dr. Alexander Trippel, of Globe, has been appointed and has accepted the position of general manager.

CROCKER MINING COMPANY.—At the annual meeting of this company held last week the following officers were elected: Wm. S. Lyle, president; C. H. Fish, vice-president; E. Gauthier, A. B. Clute and A. W. Havens, directors; Nat Misser was elected secretary, vice August Waterman. The indebtedness is reported to be $1,600.

YAVAPAI COUNTY.

Deeds have been filed for record from A. C. Gilmore to W. M. Jennings, for one-third of the Zero mine, and from T. W. Otis to the same for the Oro Flame mining claim in Hassayampa district.

MARBLE.—Deeds for the sale of this mine, near Mayer, have been filed for record, the purchaser being J. W. Dougherty, and the price paid is stated to have been $5,000.

YUMA COUNTY.

The quartz mill at Harrisburg is reported to be running night and day, crushing 23 tons of ore in 24 hours. The rock, it is stated, averages $25 per ton.

OREGON.—This mine, owned by Charles Pichenbaugh, on the Colorado River, fifty-five miles north of Ehrenburg, according to press reports, is being worked, and keeps a five-stamp mill running on free gold ore that yields $25 per ton. The pay streak, it is stated, varies in width, measuring in places three feet.

CALIFORNIA.

AMADOR COUNTY.

We condense the following from the Amador *Ledger:*

GARDINER.—The tunnel which is being run on this property has reached a distance of over 700 feet. Seven months has elapsed since Robert Stevenson bonded the property and entered upon the work of its development. Under the management of James Gleason 1,000 feet of tunnels and drifts have been run. One ledge, 10 feet wide, known as the Paugh ledge, was cut some time ago. Recently another quartz body was tapped by breaking into the side of the tunnel, the thickness of which has not been ascertained. The tunnel is now about 100 feet from the Union ledge, its objective point. There is talk of putting up a mill on the mine the coming summer.

HARDENBURGH.—Work at this mine has been suspended temporarily, owing to the impossibility of getting material for the erection of the hoisting works. The shaft has been retimbered down to a point where the timbers were found to be sound. This is all that can be done until timbers for the hoist are received.

KEYSTONE.—All the men employed on this mine in extracting rock were laid off on January 20th, owing to the impracticability of keeping the mill going, and at the same time control the largely increased flow of water incident to the incessant rains. About eight men will be kept at work underground in prospecting operations.

VOLCANO GOLD GRAVEL MINING COMPANY.—The following directors have been elected for the ensuing year: C. Hoffman, I. L. Thurber, C. C. Martin, R. Bernheim, C. S. Hohmann, A. McDonald, of San Jose, and C. H. Heath. The directors afterward chose their officers as follows: C. Hoffman, president; I. L. Thurber, vice-president; F. D. Scott, secretary, and Pacific Bank, of San Francisco, treasurer.

BUTTE COUNTY.

BERTIE FOWLER.—It is reported that E. H. Finney intends sinking a shaft 100 feet deep on this mine on Deer Creek, and expects to have it in good working order shortly. It is stated that all the capital necessary to work the mine has been raised in Porterville, among responsible parties. After sinking 100 feet Finney will run a drift by which he can tap the ledge, thence going down to a depth of about 200 feet from the surface.

NEVADA COUNTY.

San Francisco mail advices say that the mines in the vicinity of Grass Valley have all been closed down since January 11th, with the exception of the Omaha, on account of the storm. The loss to miners alone will be $1,500 to $2,000 per day, not to mention the loss to the companies. The 10-stamp mill at Howard Hill is a wreck, the damage being estimated at $3,000, although it will cost a much larger sum to replace it. The chlorination works, just outside the town, have fallen, and the loss to the owners will be very heavy. The Brunswick mill and hoisting works have also collapsed, and the Alpha will need a new building when operations are resumed. The Idaho, Empire and North Star buildings are all right, owing to the continued efforts of the shovelers, who kept them clear of snow.

SAN BERNARDINE COUNTY.

The Iron Chief and Granada iron mines of this county are reported to have been purchased by people interested in the San Luis Rey water enterprises.

COLORADO.

BOULDER COUNTY.

MADELINE MINING COMPANY.—Messrs. Hendrie & Bolthoff, of Denver, have just taken a contract for the erection of an additional 25 stamps to this company's 25-stamp mill at Ward, in this county. It will be remembered that this firm in the latter part of September, 1889, completed for this company a 25-stamp mill, near their property in that district. The same firm, says the Central City *Register Call*, will supply the company with a larger-sized boiler, also an engine of increased capacity, with which to run the full capacity of the mill, which will be 50 stamps, and a tramway 600 feet in length from the mine to the mill, thus avoiding transportation of ore by wagon to the mill, and thereby considerably lessening the expense in that direction.

CLEAR CREEK COUNTY.

We condense the following from the Denver *Republican*: The Ute Creek District is six miles from Idaho Springs, and only 44 miles from Denver. There is no other portion of the State, where fissure veins abound, which has a more promising future than this district. It is here that the famous Lamertine mine is situated. A vast tract of territory surrounds this mine, which, with rare exceptions, has as yet received a mere scratching from the prospector. Ore lies, as a general rule, at a depth of 100 to 300 feet, and when struck it is rich. All ore is shipped to Idaho Springs over a fine wagon road, open all the year. The Lamertine is an old patented lode, and remained idle for years. In the spring of 1887 Frank Craig and W. S. Comer, while prospecting, found some rich float, and traced it up to where the present No. 2 shaft is sunk. They made a location and started to sink, when they were informed that they were on patented ground. The owner of the Lamertine, Mr. Himrod, of New York City, then gave them contracts to sink the shaft. No ore was struck until a depth of 126 feet was reached, when a small "pocket" was encountered, first-class running $520, second-class $220, rock class $58 per ton net. Sinking was continued and at a depth of 250 feet the big pay was struck that has held out for nearly two years, and at the present time there is more ore in sight than ever before. Twelve fast ore sorters are at work, making two classes of the ore. The mine is worked through three shafts. The deepest one is about 365 feet. No. 3 shaft has one of the finest plants of machinery in the country. This shaft is a double compartment one and is sunk with steam drills. A cage is in use in this shaft. The output of the Lamertine is about $75,000 per month. Over $1,000,000 has been taken out in eighteen months. The present lessees, Burns, Hanchett, Armstrong and Williams, employ 122 men, who work eight-hour shifts at $3 per day. Sub-lessees, who pay 50 per cent. royalty, cleared for the month of December $1,500 per man. Ore is being turned out faster than the teams can haul it away. From 12 to 16 four-horse teams are kept busy every day in the week. The Lamertine, like all rich mines, has a thousand-and one extensions. On the east is the El Dorado, the shaft of which is being sunk as fast as two shifts can do it. It is now down about 220 feet, with scattered ore exposed in the bottom. The Ben Harrison shaft is also being sunk. An engine is to be placed over this shaft in a few weeks. For a prospect this vein shows up remarkly well. On the west is Fiancier, which is supposed to be the genuine extension of the Lamertine. The Bell and Redd shaft is now down about 250 feet, with three shifts still sinking; quartz and ore mixed in the bottom. This mine produced some very rich surface quartz. The east shaft on this vein is being sunk within a few feet of the Lamertine end lines. The Lamertine "pocket" is expected to be struck at about 150 feet. A little north of the Financier is the Monnie Musk, with a shaft down nearly 200 feet and still sinking. Some rich ore is exposed in the bottom. A fine plant of machinery will be erected next month on this property. The Chloride Hill, a fine-looking prospect north of the Lamertine, has been leased and bonded to St. Louis parties who will sink the shaft 100 feet deeper. Up the hill from the Monnie Musk is the St. Louis parties, shaft down 225 feet, and still sinking. Good ore was recently struck in the shaft. The Lost Treasure, a prospect 40 feet deep, was recently sold to Denver parties, the consideration being $3,000. A contract has been let to sink the shaft 100 feet deeper. The Albany, Hawkeye, Denver City, Union and many others lying in the vicinity of the Lamertine are all good properties.

(From our Special Correspondent.)

As far as your correspondent is informed the most of the mining enterprises of this county enter the new year in a healthy condition.

Many improvements are projected, to be carried out in spring.

The ores of this county used to be considered essentially high grade, but the lower grades, of which there are large quantities, are receiving more and more attention with each year; a fact which argues well for the future of our mines.

FALCON.—This is one of the old mines of the county which has lain idle for some years. Lately work has been resumed. A trial run of ore was made, and proved satisfactory enough to warrant the erection of hoisting works. The ore consists of a large body of gold-bearing quartz.

SAULESBURY MINING AND MILLING COMPANY.—The concentrating mill of this company is nearing completion. Its erection has necessarily been slow, as it was not begun until late in the fall. This mill is designed on the gravity plan, and is intended to be a model for the systematic and cheap handling of ore.

CUSTER COUNTY.

GEYSER MINING AND MILLING COMPANY.—According to the latest reports the shaft on this company's property has reached a depth of 630 feet. As soon as solid formation is reached the drifting and cross cuts will be begun to cut the ores.

RED SPRINGS MINING AND MILLING COMPANY.—At the annual meeting of the stockholders of this company recently the following directors were elected: C. J. Talbott, W. B. Jackson and J. A. Jackson. The directors held a meeting on the same day and re-elected all the old officers as follows: President, C. J. Talbott; vice-president, J. A. Jackson; secretary-treasurer and general manager, W. B. Jackson.

TROY.—The new strike made by Messrs. Henning, Koppe and Burkhardt, on this lode, near Silver Cliff, is one of the biggest things ever found in this county, says the Silver Cliff *Rustler*.

LAKE COUNTY.

LADY ALICE.—The deepest shaft in Leadville—that of this mine on Bruce Hill—has at last struck the contact, it is stated, and a promising body of ore. It is now 900 feet deep.

PITKIN COUNTY.

ASPEN.—This mine is shipping now an average of about 150 tons a day. Shipments, says the Aspen *Times*, are confined to six days in a week, which will bring the monthly output to 4,000 tons. The fifth level, which is the lowest level of the mine, has been following ore for the last hundred feet. Sometimes this material is very low grade, but at other points it was rich. Much of the rock found in this level is very hard and progress is consequently slow. It is a blue dolomite, carrying much silica. Its hardness can be nnderstood when it is stated that sometimes as many as 70 drills are dulled in putting in one hole

The winze that is being sunk from the third level has now reached to about the level of the fifth. It has developed some ore.

ASPEN BELT MINING AND MILLING COMPANY.—This company has been organized with a capital stock of $500,000, shares $1 each. Among the incorporators are H. B. Gillespie, W. W. Cooley, E. F. Trost, and M. Good. The objects for which the company is organized are to buy and sell and lease and operate mines in Eagle and Pitkin counties. The principal office is located in Aspen.

TOURTELOTTE MINING COMPANY.—In the fourth level in the Bay State, which is being worked by this company, of St. Louis, a streak of from 12 to 20 inches of ore has been discovered, says the Aspen *Times*. An average of this ore which was run a few days ago returned 39 ounces of silver per ton. An analysis was made to determine what it would bring under the new schedule that lately went into effect, and it is found that it can be marketed at a profit of about $15 per ton, with the cost of mining to be deducted; also that that class of ore running as low as 25 ounces per ton will return a profit of $7.50 a ton, with the cost of mining to be taken out. This body of ore is being prospected with a view of determining whether it is worth while to set about its extraction. In the meantime work on the main shaft continues.

(From our Special Correspondent.)

Ore shipments for the week ending January 24th, 1890, were as follows: To Denver, 981 tons; to Pueblo, 1,263 tons; total, 2,252 tons.

ASPEN MINING AND DRAINAGE COMPANY.—In the Homestake shaft of this company little progress has been made by the new management, not being accustomed to power drills, and the change in the hardness of rock caused the drills to break. Sixteen feet have been made, giving a total depth of 332 feet.

SAN MIGUEL COUNTY.

UNITED STATES GOLD PLACERS COMPANY, LIMITED.—Two creditors' petitions to wind up this company came before Mr. Justice Chitty, in the Chancery Division of the High Court of Justice, on January 18th in London. Mr. Maclean, Q.C., appeared for the company, and said it had been arranged that the petitioners' debt should be paid and that the petition should be dismissed, the company paying the costs.

SUMMIT COUNTY.

VICTORIA MINING COMPANY.—According to the Summit County *Journal*, there are nearly 100 men working on the various leased properties on this company's ground on Farncomb hill.

DAKOTA.

PENNINGTON COUNTY.

FOUR MILE.—The Hill City *Miner* makes the statement that a Mr. R. P. Moss, of New York, has organized a company with a large capital to develop these mines.

ILLINOIS.

WHITEBREAST FUEL COMPANY.—This company, whose property is located in Illinois and Iowa, reports for December sales of 59,174 tons of coal and $12,848 net earnings, compared with 84,398 tons and $23,719 in 1888. For six months tonnage has been 357.213 against 419.121 a year ago, and net earnings $67,283 against $98,525.

MICHIGAN.

COPPER MINES.

FRANKLIN MINING COMPANY.—Advices from this mine state that number three shaft is down to the thirty-second level. Cross-cutting east will be begun in a few days. The general appearance of the mine is good. The works are in good shape and working smoothly.

HURON MINING COMPANY.—This mine is looking better now than a month ago, according to a letter from Superintendent Vivian. Number six shaft is expected to reach the twentieth level this month. The seventeenth level south of number eight shaft shows very promising growth.

QUINCY MINING COMPANY.—The new mill on this company's property will be lighted by electri city. A contract has been made to equip the mill with a 25-arc light machine. The lights will have a power of 2,000 candles each, and the system will be the Thomson-Houston.

GOLD MINES.

MICHIGAN GOLD MINING COMPANY.—The new Huntingdon mill is not yet working smoothly and satisfactorily, says the *Iron Ore*, of Ishpeming. The breaking of the crusher and the freezing of the suction pipe from which the water of the lake was obtained caused considerable delay; and it was found that the boiler capacity was not sufficient to drive all the machinery, so it will be increased by the addition of a second boiler, which will soon be in place. On the start, rock of inferior grade will be treated, the object being to get the plates in good condition before that of high grade is run. Mining work is being conducted at the deep shaft and one feature of the latter is that the vein now makes vertically, or with a very slight inclinatlon to the north.

IRON MINES.

CHAPIN MINING COMPANY.—At the annual meeting of this company the following officers were re-elected: President, Ferdinand Schlesin-

ger, Milwaukee; Secretary, A. H. Wagner, Milwaukee; Treasurer, Wm. Schlesinger, New York. At the company's mine preparatory work is receiving considerable attention. The timber shaft is down to the fifth level and will soon be in working condition to the fourth. Drifting west is being continued at the fifth and sixth levels, and at the fifth the crosscut to "D" shaft will be commenced within a short time. Work at "B" is also giving more satisfactory results, but at "C" much delay and trouble is caused by the formation of ice, especially at the sixth level, and the rope haulage has been seriously interfered with. The ice has given little trouble in the shaft, but the pulleys and sheaves carrying the transfer rope have become clogged with ice which has formed from the moisture gathered and deposited by the rope itself.

CLEVELAND IRON MINING COMPANY.—This company, according to press reports, has bought seven-tenths of the stock of the Iron Cliff Mining Company, which owns 53,000 acres of land in the south, east, and west of Marquette, in the heart of the Lake Superior iron district, for $1,750,000. The reported purchasers are well known in mining circles. They are: J. H. Wade, $400,000; Selah Chamberlain, $300,000; Samuel Mather and W. L. Mather, jointly, $300,000; George Howe, $125,000; T. P. Handy, $50.000; and J. V. Painter, $25,000. Besides this, the Clark estate, C. I. Baldwin, J. B. Savage, W. J. Gordon, Lamprecht Brothers & Co. and Charles H. Potter & Co. are interested. The Iron Cliff Company's mines belonged to the New York syndicate controlled by Samuel J. Tilden, W. H. Barnum and S. M. L. Barlow, and were bought twenty-five years ago. The company was capitalized at $1,000,000, divided into 20,000 shares at $50 each.

Only a portion of the vast tract has been opened. The Cleveland men have been negotiating with the Iron Cliff Company since the death of Samuel J. Tilden, but it was not until after the death of W. H. Barnum that a verbal option for a majority of the stock was obtained. The company will be reorganized, with headquarters in Cleveland.

HANCOCK IRON MINING COMPANY.—Work has been temporarily suspended on this company's property, owing to the illness of the contractor who was sinking the shaft, which is down about 25 feet, and has about the same distance to travel before the ledge is reached.

LUDINGTON MINING COMPANY.—At the Ludington the new shaft is down about 160 feet and the work of raising from the lower levels will aggregate about as many feet more. The completion of this shaft will, besides allowing for a good connection with the lower levels of "A" shaft (the deepest on the property), permit the safe and economical taking out of much ore from pillars, etc., at the upper levels of the old shafts. But little ore is being stocked just now, as No. 5 shaft is being repaired and made into cage shaft, and "A" shaft is being used much of the time for lowering timber. No. 5 shaft of the Ludington mine was burned out on the 27th inst. No miners were injured. Loss heavy; insured.

ROTHERTON IRON MINING COMPANY.—This company held its annual meeting in Milwaukee January 28th. Joseph Sellwood, the president, presided. Edward Niedecken, the secretary, and Martin J. Luther, the treasurer, submitted their reports. The reports showed that on January 1st, 1889, there were 4,239 tons of ore in stock at the mine, and 78,813 tons were mined during the year. The number of tons sold during the year 76,991. The ore sold at the mine for $2.80 per ton, and at Cleveland for $4.90 per ton. The one yielded a net profit of 82 cents per ton, and the total profit was $60,212.88. The company has cash to the amount of $77,162.77 in hand, and the equipments are valued at $22,825.84. During the season the company employed about 165 men on an average. The amount of ore in stock January 1st, 1890, was only 516 tons, the mine having shipped ore by rail after the close of navigation. The prospects for the coming season were reported very good. The mine, it was stated, expected to ship 75,000 tons this year, and it is estimated that a net profit of 90 cents per ton will be cleared. The number of shares represented at the meeting was 44,893 out of a total of 80,000. By mid-summer, it is stated, the company will probably declare a dividend of 50 cents per share, being a total of $40,000 on the past year's operations. The present officers, who were chosen last July, will serve until next January.

WINDSOR MINING COMPANY.—The annual meeting of this company was held recently. C. H. Hildreth of Chicago, was elected president and treasurer; B. W. Weil, vice-president; H. H. Walters, secretary. The board of directors consists of the officers named and William E. Cramer, George Posson and L. S. Hyde. The company owns the Nimikon mine, which shipped last year 26,800 tons.

MINNESOTA.

Articles of incorporation of the Enterprise Iron and Land Company and the Hope Iron and Land Company have been filed with the Register of Deeds in Duluth. Both are organized for the purpose of mining and smelting iron and copper ore and manufacturing and otherwise disposing of the product. The capital stock of the first is $50,000, with a limit of indebtedness of $50,000. The officers, who are also the directors and incorporators, are Joseph Frank, president, Chicago, Ill.; Emil Hartman, vice-president, Duluth; Leopold Moss, general manager, Chicago; Lazarus S. Minzesheimer, secretary, Chicago; David Goodman, treasurer, Chicago. The capital stock of the Hope Iron and Land Company is $25,000, and the limit of the indebtedness is $25,000. The officers are the same as those of the Enterprise Company, with the exception of Lazarus Silverman, treasurer, in place of David Goodman.

MISSOURI.

THE LEHIGH DISTRICT.—Johnson & Co., of St. Louis, are making valuable improvements on the Neighbors tract of mineral land which is under the management of S. A. Stuckey. They now have in place a battery of boilers of 250-h. p. capacity an 80 h.p. air compressor, one complete Ingersoll power drill, and one No. 1 Brake crusher. They are erecting a jig concentrating plant, and are preparing to put in dynamos for lighting both the surface and underground workings. This is a move in the right direction. When this plant is completed and in mining order, there will be demonstrated what can be done by the use of improved mining machinery. Wm. M. Leckie is putting in a good plant, under the direction of Mr. McFerran, to replace the plant recently destroyed by fire.

BATES COUNTY.

RICH HILL COAL COMPANY.—This company during 1889 shipped 21,623 cars of coal against 25,291 cars in 1888. A local paper explains that the showing for 1889 would have been much larger but for the accident to one of the company's shafts, No. 14, which was so badly damaged by an explosion and subsequent fire and water that it was idle for a long time at just the season when the demand for its product was greatest. But the mine is now in complete running order again.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, Feb. 3.

There was an increase in activity among the mines during the week ending February 1st, as the value of the output indicates. Lehigh, East and West Hollow and some of the mines at Galena had still to contend with heavy waters, but in other districts operations were pushed vigorously up to Friday, when a severe rain set in that made the roads heavy and interfered with hauling. The principal cause of the light sales and shipments was the low price of zinc ore. The prices of the previous week ruled, but miners and operators feel that with spelter at its present price zinc ore should sell at from $28@$30 per ton. Thus many operators are keeping the ore in their bins. The following are the sales of ore from the district for the week ending February 1st: Joplin mines, 684,960 pounds zinc ore and 102,725 lead, value $11,121.50; Webb City mines, 886,780 pounds zinc ore and 59,055 lead, value $12,886; Casterville mines, 495,720 zinc ore and 67,080 lead; value $8,948; Zincite mines, 422,565 pounds zinc ore, value $3,677.35: Galena, Kans., mines, 1,599,140 pounds zinc ore and 51,800 lead, value $8,281.44; all districts, total values, $44,851.29.

BAY STATE MINING COMPANY.—This company, on the Oswego land, sold 48,650 pounds zinc and 6,280 lead.

CONSOLIDATED.—Mr. A. F. Donnau, superintendent of this company, has spent most of the week in pumping water, which is now virtually under control. This property has more than its share of water to handle, owing to being located on low ground along Joplin Creek, through which flows surface waters pumped from other tracts of land.

DIAMOND.—This mine only worked on ore three days and produced 50,000 pounds zinc and 10,000 lead.

EMPIRE MINING COMPANY.—This company's concentrator only ran one and one-half days, having to shut down for repairs, but during that time produced $1,700 worth of ore.

INTER-STATE MINING COMPANY.—This company has over 200,000 pounds zinc ore in their bins, holding for better prices.

OSWEGO MINING COMPANY.—This company will make a good showing this year. It was organized under the laws of the State of Missouri, with a capital stock of $50,000, but has since been increased by the purchase of land to about $200,000. The company now owns 753 acres, 200 of which are within the city limits of Joplin. The company is a close corporation and none of the stock is on the market. The officers are as follows: A. G. Cook, president, and H. Stevenson, vice president, both of Oswego, New York, and Samuel C. Cook, secretary and general-manager, Joplin, Mo. A wide open valley runs through the tract of land from north to south with branches or feeders running out to the east and west. On this land are the noted Parr. Hill and Swindle Hill mines where fortunes were made in the early days by surface mining. There are many old shafts only 10 to 12 feet in depth that have produced thousands of dollars. It must be understood that in the early days of mining in this district everything was done in the most primitive manner, and even to-day there are few modern mining methods employed. There are, however, good pump plants all over the district. The Oswego Company, as has been stated, is under the management of S. C. Cook, one of the owners. During the past six months Mr. Cook has put in five of the latest improved direct acting steam pumps for draining purposes, and they are giving perfect satisfaction. The company has also in operation four of the old style lift pumps working by a string connection from a central power plant. The plan of working the property may be termed the lease or tribute system—that is to say, a small company or syndicate will lease for a term of years a certain number of acres, agreeing to pay a royalty of 10 to 15 per cent. on all lead and zinc ores mined from the land held under lease. The lessees develop their tract of land at their own expense, and when ore bodies are opened up they will then sublease lots 200 feet square to other companies or individuals. The lot miners, of course, pay an increased royalty, or about 20 per cent. on zinc and 30 to per cent. on lead. This lease system was established in the early days and has since been particularly advantageous to the miners and operators of small means. There are now several companies operating under the plan. There are a number of good plants of machinery on the land. Five lines of railways pass over it, thus affording the best of transportation facilities. The value of the ore produced from the land since it was first opened to June 30th, 1889, was $1,255,366.66, and but little mining has been done below the 100-foot level. In fact it may be said that all work has been confined to surface deposits and that not one-tenth of the surface has been opened up.

STANDARD MINING COMPANY.—This company at Zincite is putting in full time, and during the past week produced and sold $3,026.85 worth of zinc ore. It expects to start its new plant of machinery the coming week.

MONTANA.

DEER LODGE COUNTY.

HOPE MINING COMPANY.—This company has commenced the sinking of a shaft on the True Fissure lode, which is one of the first claims that the company ever had patented. It is located about 200 feet northwest of the Northwest mill, at Tower. The shaft is to be sunk 50 feet now, and if the indications look favorable at that depth the work will continue. The surface indications are in every way satisfactory.

From present indications, says the Phillipsburg *Mail*, it appears that the Hope company intends making a complete change in its officers, having already elected a new president, and W. W. Adams has tendered his resignation as superintendent. Who his successor will be is not known, although it has been rumored that G. B. Ballard will get the place.

NELSON-ELIZABETH.—In this property, says the Philipsburg *Mail*, a rich body of ore has recently come in sight. The Nelson claims are located tween Philipsburg and Granite, on the Hasmark road, and consist of the Elizabeth, Cam Lorenzo and Lancaster lodes. The principal developments have been made on the Elizabeth, where drifts have been run 659 feet west and 150 feet east, showing ore all the way. August Meyer, of Granite, who is president of the Elizabeth Company, started for New York recently to close negotiations with a syndicate of gentlemen in that city who have been figuring on making the purchase for some time. It is understood that as soon as the sale is closed the New York syndicate will proceed to sink a two-compartment 300-foot shaft. Mr. Nelson has donated 60,000 shares of his stock to the new company, thereby giving them the controlling interest. Mr. Meyer says the Granite and Bi-Metallic companies have both made liberal offers to gain the control of this property, but the owners were desirous of getting other capital in the district, and have succeeded. The vein that is now exposed is a true fissure, five feet wide, and laying a little northwest of the Granite and Bi-Metallic ore bodies. It is thought that the Nelson-Elizabeth vein is possibly an extension of these bodies.

JEFFERSON COUNTY.

CYCLONE GOLD AND SILVER MINING COMPANY.—This company has been incorporated by James

M. Ryan, Leopold F. Schmidt, George B. Childs ayd T. H. Burke. The capital stock of the company is $500,000, shares of $1 each. The company will develop the Cyclone, Lady Franklin, Silver Valley and Nevada mining claims, in this county.

HUMBOLDT MINING COMPANY.—A meeting of the stockholders of this company is to be held at the office of the company in Wickes, to take into consideration the question of selling the property of the company. The mine is looking well, a recent strike of a body of ore yielding thirty to forty ounces in silver, 14 per cent. of copper.

PENN PLACER MINING COMPANY.—At a meeting of the stockholders of this company held in Philadelphia recently, Mr. Joseph P. Reed was elected vice-president and managing director for the year 1890. Mr. Reed will return to Montana in the spring and take charge of the company's property, which is situated on Jack's creek, Jefferson County.

LEWIS & CLARKE COUNTY.

According to local reports, the Little Giant and Hopeful lodes, situated in the Drum Lummon district, have been bonded in the interest of Eastern capitalists, who propose at an early day to sink a shaft on the Little Giant and to do other development work.

KENNEDY.—The new shaft on this property, southeast of Helena, has been sunk far enough, says the Helena *Independent*, to justify a level to the old shaft, which is now being run. The distance between the two shafts is about 200 feet, and when the level is completed the mine will be in good shape for extracting ore.

MINAH.—After a good deal of delay and speculation as to the result of the proposed sale of this property, to which reference was made in the ENGINEERING AND MINING JOURNAL of January 11th, everything was satisfactorily arranged, and the representatives of the English syndicate left for the East. The new company is to take possession within thirty days, when the mine will be under the joint management of J. O. Brisco and a representative of the English syndicate. Prof. Schoenberg, who was the promoter of the scheme, and who has been unceasing in his efforts to effect a sale, is deserving of great credit for his part in the matter. The amount to be paid for the mine is $400,000 and 80,000 shares of paid up capital stock; $100,000 to be placed in the treasury of the new company for use as a development fund, and $300,000 to be paid to the owners.

IRON MOUNTAIN.—In this mine the main shaft is now down 360 feet, and the work of sinking, running levels and thoroughly opening the mine and putting it in shape for the extraction of ore is going ahead rapidly with three eight-hour shifts of miners. No ore is being stoped, says the Helena *Independent*, for the reason that none is being shipped, will not be until spring at least, and probably not before the Northern Pacific branch to the Cœur d'Alenes has been completed as far as the mine. The ore has heretofore been shipped by wagon to the Missoula River, thence by boat to the town of Missoula; but since cold weather set in the river has been frozen, and no shipments have been made. The new railroad will pass within four miles of the mine, and will result in the saving of about $8 per ton over the wagon and river route. No attempt has been made to take out ore, but in the course of development about $100,000 worth has accumulated on the dump. With the opening of spring the mine will be in such shape as to easily produce from 40 to 50 tons per day. A new strike is reported in the cross-cut between the fourth and fifth levels at a depth of 300 feet.

SILVER BOW COUNTY.

MOULTON MINING COMPANY.—A winze is being sunk from the 700 level of the Moulton. The ore now being milled is reported to be mostly low grade, and only 20 stamps are dropping on it, the remainder being used to mill custom rock.

NEVADA.

ELKO COUNTY.

DEL MONTE MINING COMPANY.—At the annual meeting the old directors and officers were re-elected. The company is in debt $5,583.

NORTH COMMONWEALTH MINING COMPANY.—At the annual meeting in San Francisco on the 28th inst. 96,075 shares were represented. The following directors were elected: E. Scott, F. A. Berlin, John F. Cassell, J. W. Pew and M. A. Jackson. E. Scott was reappointed President; F. A. Berlin, vice president; J. W. Pew, Secretary; F. F. Coffin, superintendent, and Bank of California, treasurer. The present indebtedness of the company is $15,745.85. The superintendent's report had not yet been received owing to the blockade.

STOREY COUNTY—COMSTOCK LODE.

Mail advices from Virginia City, which have been greatly delayed, report that the snow blockade of sidetracks leading to ore producing mines has caused the curtailment in the yield of the Comstock lode below the usual average, but has entailed no suspension of exploratory work except at the Utah, which is temporarily shut down until the roadway leading to the hoisting works is opened for the passage of teams. The depth of snow now accumulated is said to be ample to keep the Carson River flow up to a volume that will admit of the stamp mills along its course being operated to their full capacity throughout the entire summer.

BELCHER MINING COMPANY.—The annual meeting was held in San Francisco on the 28th ult. 81,454 shares out of 100,000 were represented. The old directors were re-elected, as follows: James Newlands, J. H. Dobinson, A. K. P. Harmon, George D. Edwards and J. P. Martin. The following officers were appointed: President, James Newlands; vice-president, A. K. P. Harmon; secretary, William F. Perkins; superintendent, Sam L. Jones, and treasurer the Bank of California. The only change in the officers was the appointment of William F. Perkins as Secretary. Since the death of John Crockett, F. E. Deitz had temporarily held the position, and he will continue in the office as assistant, under Mr. Perkins. The company had a present indebtedness of $18,000. Owing to the blockade, the report of the Superintendent had not been received.

CONSOLIDATED CALIFORNIA AND VIRGINIA MINING COMPANY.—The following dispatch, received in San Francisco on the 27th ult. by D. B. Lyman, superintendent of the Consolidated California & Virginia mine, shows how affairs stood at that mine and is a reflex of the general situation on the Comstock lode last week.

"The immense quantity of snow, cutting off all railroad communication, made it necessary to lay off all almost the mining hands. Everything has been kept in the best shape, without disaster or damage, and ready to start up again at a moment's notice when the time comes. There are encouraging signs that the railroads will be open in a day or two. Only seven bars of bullion so far to be shipped when the way is open."

A. W. Havens, secretary of the company, estimates the seven bars of bullion mentioned in the dispatch to be valued at from $28,000 to $30,000. This will probably be the entire bullion product of the mine for the month of January, and it is doubtful if the expenses of the month will be made. A surplus of about $75,000 was carried over from December. The total amount of a 25-cent. dividend is $54,000, but it does not look as if it would be possible to pay one for the current month, and, says the San Francisco *Report*, if one could be paid, it would not be good business policy to pay it.

The same as at the Consolidated California and Virginia mine, the underground operations in the Ophir, Mexican, Union Consolidated, Sierra, Nevada, and other north-end mines, with the exception of the Utah, have been practically suspended, and confined to the repairs to drifts and timbering. This has been done to economize fuel. Only sufficient steam has been kept in the boilers to prevent the pipes from freezing and to lower and hoist the small force of miners. The Utah mine has a full supply of fuel for the winter and exploratory work continues on the 600-foot level. Twenty stamps of the Nevada mill were run on Chollar ore last week and crushed 409 tons, showing an average battery assay of $21.25 per ton. It was impossible to send any ore from the Hale & Norcross to this mill. Consequently none was extracted from that mine. The usual exploratory work continued. At the Savage explorations were in progress on the 400, 500 and 600-foot levels,.

SIERRA NEVADA MINING COMPANY.—At the annual election, held recently in San Francisco, the following officers were elected: C. H. Fish, president; A. W. Haven, vice-president; L. S. Parker, secretary; W. B. Lyman, superintendent; Con. O'Connor, Charles Hirschfeld, directors.

UTAH CONSOLIDATED MINING COMPANY.—At the annual meeting of this company, held in San Francisco, on January 29th, the total stock represented were 95,632 shares out of 100,000. The following officers were elected: Henry B. Havens, Herman Zadig, Joseph Marks, George R. Wells and James J. E. Hawkins. At a meeting of the directors H. B. Havens was elected president; A. H. Fish, secretary, and James G. Rule, superintendent. The company has a cash balance of $7,134.78.

NEW MEXICO.

GRANT COUNTY.

LAST CHANCE.—Mr. John M. Wright, of Silver City, has just succeeded in placing this mine, says the Silver City *Enterprise*, with a syndicate of Nebraska and Chicago capitalists headed by R. F. McComas, of Nebraska City. This property was located, in 1887, by James Connery and Martin Johnson, and forms part of the most southerly of the three east and west contacts of Silver Creek. It lies east of the Confidence and Blackbird and on the same lode and at its east end joins the Queen. The Last Chance averages 20 feet of ore having a milling value of $15 per ton. A mill run of 100 tons made last September at the Sheridan mill averaged at the battery $18.45 per ton. It is free milling. For a long time no working shaft will be needed, the property being so situated on the mountain side that a depth of 800 feet can be attained by tunneling. Preparatory to the erection of a 20-stamp mill, a working tunnel on the vein will at once be started under the direction of P. Kirkegard, who assisted Mr. Wright in his examination of the property. Mr. Wright procured his bond on the mine early last December and it is upon verification of his report that the sale has been made.

PENNSYLVANIA.

COAL.

The following collieries in the Schuylkill region drawn at Pottsville to return prices for coal in January, 1890, to determine the rate of wages to be paid, make returns as follows: Alaska Colliery, (P. & R. C. & I. Company), $2.40.3; Eagle Hill Colliery (P. & R. C. & I. Company), 2.38.4; Ellengowan Colliery, (P. & R. C. & I. Company), 2.35.8.; Turkey Run Colliery, P. & R. C. & I. Company, 2.40.9 Wm. Penn Colliery (Wm. Penn Coal Company), 2.32. The average of these prices is $2.37.5 and the rate of wages, for the last half of January and first half of February, 1890, is four per cent. below $2.50basis.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY.—The explosion in the Pettibone shaft of this company's mine, on the 5th inst., according to a dispatch, proved to be a more serious matter than at first reported. The shaft is one of the deepest in the Wyoming region, and its timber linings are completely burned away. The fire departments of Wilkesbarre and Kingston poured water into the shaft. In order to prevent the fire attacking the coal it was found necessary to flood the mine. The new breaker, valued at $80,000, was saved. With the exception of the four men burned in the explosion nobody was hurt. The loss will be large, and it will require months to make the necessary repairs.

SOUTH DAKOTA.

LAWRENCE COUNTY.

IRON HILL MINING COMPANY.—Very little has developed relative to the burning of the hoist. Examination of the shaft, says the Deadwood *Times*, shows necessity for repair down to the 100 level, but the station at that point is uninjured. One of the boilers is serviceable to the extent that it can be used for generating steam for the pumps, which will be in operation to-day. All work in the mine has been suspended. The loss occasioned by the recent fire to this company's hoisting works, according to the local papers, did not exceed $20,000, and was reduced by insurance to $12,500.

SPANISH R MINING COMPANY.—This company is now pushing work in its main shaft. This, now 280 feet deep, will be carried down from 50 to 100 feet more. Stations will be cut, says the Deadwood *Pioneer*, wherever it may be determined to make levels, though it is probable drifting will not begin until the 350 level has been reached. The company is shipping some ore at present, but will probably discontinue doing so after what is now on the dump has been forwarded.

FOREIGN MINING NEWS.

CANADA.

ONTARIO—PORT ARTHUR DISTRICT.

(From our Special Correspondent.)

MAPLE LEAF GOLD MINING COMPANY.—This company has been testing the "Black Fox" gold location since June of last year, and is so thoroughly satisfied with the results that the manager, Captain S. V. Halstead, has gone to Chatham, Ont., the company's headquarters, to make arrangements for working the mine on a large scale. The property is situated seven miles east of Tache Station and three-quarters of a mile south of the line of the Canadian Pacific Railway, to which an almost level siding can be made. Captain Halstead, in company with two experienced miners, began operations in June last by thoroughly exploring the neighborhood in which the Black Fox is now located. He noticed that the veins located on the Wawbeck, Baby, Gates Ajar and Sable ran north and south. He traced them out to the southward until they all ran into a large east and west vein, averaging at the point of contact about 35 feet. On this vein or ledge he located the Black Fox and set his men to work sinking test pits along the entire length of the vein, extending for over half a mile

within the limits of the company's property. The result of the exploratory work showed that the vein averaged 100 feet in width. It is composed of white, brittle, sugary quartz, with no gold or other mineral visible to the naked eye, the average value from numerous assays, by different assayers, being $9 per ton, free milling. A remarkable feature of the assays was the great similarity of the results obtained from rock taken from the surface at intervals of 100 feet from end to end of the vein, and to a depth of 25 feet. Out of the various test pits the highest assays showed $12, the lowest $8 per ton. They have 300 tons ready for shipment, as the result of three men's work for six months. They propose shipping it to different points to have accurate tests made. It is expected that for the present the bulk of their output will be shipped to Kakabeka, as the promoters of the quartz mill at that point expect to have their mill running early in the summer.

NOVA SCOTIA.

CALEDONIA.—The outloook at this mine at Molega is improving. The south lead has been opened by six shafts for 1,109 feet, the greatest depth being 47 feet and the least 15 feet. The lead is 5 inches in width, with a working belt of slate 3 feet wide. At every point where the lead has been cut, according to local papers, it has shown well in free gold. There are 300 tons of quartz from this lead ready for crushing. The company has a 10-stamp mill almost ready for operation. This property has been but partially prospected.

PARKER DOUGLAS.—At this mine, adjoining the Caledonia, everything is in an active condition, says the *Gold Hunter*. Last week new a battery of five stamps was put in operation, making ten in all, and ten more will be ready for work in the course of a month or thereabouts. The mine is under the superintendence of Mr. Roderick McLeod, who was at the McGuire mine in Whiteburn. Two new leads have been operated to the southwest of the mill, and they are making a good show of free gold. Mr. Gilbert Parker, president of the company, is now at the mine, and will remain there for a few weeks.

CHILI.

The news from Lima, stating that the "Grace contract has just been signed by the Supreme Government of Peru," again calls the attention of the commercial world to those countries of the Pacific coast which supply agriculture and industry with fertilizers and with copper. Leaving aside Peru, which is about to be renovated through the renewed exploitation of its guano beds, says the New York *Tribune*, and other agricultural resources, thanks to the operation of the Aspillaga-Donoughmore-Grace convention, it may be interesting to add a few statistics to those already published. The mineral industry has an extraordinary importance in Chili, since its products constitute the principal element of export, necessitated to counterbalance the importations of the country. The "Bulletin of the Mineral Society" of Santiago, of the 30th of last September, published statistics covering a period of forty-five years, from 1844 to the end of June, 1889. The exported minerals of all classes amounted in value to $937,000,000, which represents an average of more than $21,000,000 annually. Copper holds the most prominent place in these statistics, since it counts for 33 per cent. in the total of exports. Nitrate occupies the second place, with a quota of 26 per cent.; and silver in bars comes after, represented by 13 per cent. of the total exports. During the 45 years there were exported 146,253,741 kilograms of copper in bars valued at 16,201,927 pesos, while copper ore amounted to nearly 700,000,000 kilograms, valued at 100,283,537 pesos. Nitrate was exported to the amount of almost five milliards of kilograms, of a value of 245,885,758 pesos, while the exports of guano only reached 544,000,000 kilograms, producing 16,000,000 pesos, or dollars. During the same period of nearly half a century, Chili has produced gold only to the amount of 3,984,526 pesos, which is very little when compared with the needs of the world. This kind of mineral industry is greatly appreciated in South American countries, because it requires a large capital, which is spent in salaries, etc., in the places of exploitation, and gives a greater activity to the local retail trade. This explains how the papers of the Argentine Republic, notably *El Economista Argentino*, express the wish that, despite the feeble products of gold in Chili, their country hould begin to exploit its own mineral resources, among which they hope nitrate and copper may be found, as well as in Chili.

MEETINGS.

Illinois Steel Company, at the Rookery Building, Chicago, Ill., February 12th, at twelve o'clock noon.

Lindon Mining Company, at 288 Livingston street, Brooklyn, N. Y., February 12th, at 8 P. M.

Lucky Hill Consolidated Mining Company, at the office of the Baldwin Hotel, San Francisco, Cal., February 13th, at three P. M.

Wild Deer Gold and Silver Mining Company, at Room 3, No. 55 Broadway, New York City, February 20th, at twelve o'clock noon.

DIVIDENDS.

Granite Mountain Mining Company, dividend No. 62, of 50c. per share, aggregating $200,000, payable February 10th.

Sloss Iron and Steel Company, coupon due February 1st on the first mortgage bonds, will be paid by the Central Trust Company of New York.

Whitebreast Fuel Company, quarterly dividend of one and three-quarter per cent., payable February 10th, at No. 18 Broadway, New York.

ASSESSMENT.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of Sale.	Amn't per share.
Adelaide, Nev	1	Dec. 31	Jan. 3	Feb. 28	.10
Alliance, Utah	..	Dec. 18	Jan. 20	Feb. 10	.10
Allouez	..	.....	.....	Feb. 20	.50
Baltimore	6	Jan. 10	Feb. 21	Mar. 12	.20
Bellevue - Idaho, Idaho	..	Dec. 20	Jan. 27	Feb. 15	.25
Best & Belcher, Nev.	..	Jan. 6	Feb. 13	Mar. 6	.25
Cambrian, S. Dak.	3	Jan. 2	Feb. 5	Feb. 24	.001½
Car. Leonard, Idaho	..	Dec. 14	Jan. 23	Feb 14	.07½
Col. Quartz, Cal.	2	Jan. 9	Feb. 11	Feb. 28	.01
Cons. New York, Nev	2	Dec. 11	Jan. 15	Feb. 5	.15
Co. St. Gothard, Cal	1	Jan. 14	Feb. 17	Mar. 10	.05
Exchequer, Nev.	28	Dec. 16	Jan. 21	Feb. 11	.25
General Crook, Dak.	6	Dec. 9	Feb. 1	Feb. 20	.00¼
Golden Reward, Dak.	5	Jan. 10	Feb. 12	Mch. 1	.02
May Flower, Cal.	45	Dec. 27	Feb. 3	Feb. 25	.50
Mineral Hill	..	Jan. 15	Feb. 19	Mar. 10	.003
Morning Star, Nev.	6	Jan. 4	Feb. 10	Feb. 28	.01½
Natmoa, Cal	2	Dec. 21	Jan. 28	Feb. 20	.05
Overman, Nev.	61	Dec. 31	Feb. 5	Feb. 26	.25
Queen Bell, S. Dak.	5	Jan. 10	Feb. 15	Mar. 5	.01
Rochester, Utah	..	Dec. 24	Jan 25	Feb. 10	.01¼
Seg. Belcher & Mides, Nev.	5	Jan. 4	Feb. 6	Feb. 26	.25
Silver King	4	Jan. 15	Feb. 26	Mar. 27	.30
Spanish R., S. Dak.	2	Jan. 9	Feb. 10	Feb. 27	.02
Teirakoff, Cal.	3	Dec. 14	Jan. 21	Feb. 14	.01
W. Y. O. D., Cal.	5	Jan. 6	Feb. 8	Feb. 25	.15

MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 191 and 192.]

New York.

FRIDAY EVENING, Feb. 7.

Weakness and inactivity have characterized the market for mining shares during the week. The dullness is not at all encouraging to those who are hoping for an increase in legitimate mining business in this market. As we have frequently stated, the trouble is a radical one and can only be remedied by the most vigorous action. The committee on mining securities met on Tuesday last but did little, save to consider the application for listing of a Montana enterprise.

The specialties have furnished almost the only activity of the week. Phœnix of Arizona opened at 80c. last Saturday and sold up to 87c., declining to 78c. on the succeeding day, and latterly dropping to 65c. Mr. A. G. Bradstreet has been elected president, and will go to Arizona to superintend. The other active Arizona share on the list was Silver King, which, probably under the influence of 30c. a share assessment, ruled at lower figures. Sales were made from 15 to 20c. The Eastern transfer agent is not as yet ready to transfer stock in this city, not having received the necessary stock books.

None more deserves to be classed among the specialties than does El Cristo which has shown a slightly weakened tendency toward the close. This can be attributed rather to the general dullness than to any unusual speculative influences. Insiders are not doing much in the stock, and so far as they are concerned, quotations are steady. Sales were made last Saturday at $1.67½@$1.65, latterly sales were made at $1.55, closing to-day at $1.60 bid, $1.65 asked.

Not a sale of Alice was made during the week. In fact very little has changed hands of late. Bids are slightly lower than they were a week ago, but there is a large demand for the stock at the low figures, say $1 to $1.10. As time passes, traders increasingly wonder why no report of the proceedings of the annual meeting of the stockholders in Salt Lake City, on January 14th, has yet been received. There have been vague rumors that during January the mine has not done as well as was expected, but an official statement of the actual condition of the property at the time of the annual meeting, as well as the financial status of the company, which stockholders have certainly a right to know, has not been forthcoming. Even if the present management does control a very large majority of the company's capital stock, it should be remembered that the minority has some rights which the majority is bound to respect, and that even the smallest stockholder has a right to know what is being done with his property.

Colorado shares have not shown much activity this week. Denver City sold at 10c. after being dormant for a long time. Lacrosse has changed hands at the old figure of 7c. a share. Breece has continued firm on reports of the improved condition of the property and correspondingly better prospects of the company. A rise of from 35 to 40c. is reported. Leadville Cons. has been fairly steady at 12@14c., closing at 12c. bid. Nothing was done in Small Hopes. Freeland is quiet in the neighborhood of 60c. Aspen has also continued very firm, sales being made at $7.50@$8. It should be remembered that the time during which stockholders in the old Cashier Company may participate in its reorganization under the name of the Brooklyn Mining Company expires on the 14th inst.

The great storm of last week on the Comstock lode prevented the operation of most of the mills and mines, and completely interrupted traffic and communication. Values of Comstock shares as a rule hold their own. Consolidated California and Virginia sold early in the week at $4.95@$5, but latterly weakened to $4.50 bid. Other sales of shares of mines in this district included Crown Point $1.65, Hale & Norcross $2.90, Alta $1.35, Andes 65c.. Best & Belcher, $2.50; Bullion, 70c.; Chollar, $2.75; Julia, 35c.: Mexican, $2.90; Occidental, 80c.; Potosi, $1.90; Silver Hill, 44c.; Utah, 70@75c. Common stock of the Comstock Company sold at 19c.; bonds sold at $31, and the scrip at $32. Old Sutro Tunnel stock appears on the sales list at 6c. We believe that the time for the new managers of the Comstock Tunnel Company to file an answer to the dissatisfied stockholders expired on the 5th inst. As yet no information has been received as to the nature of the complaint that has been made.

In the Tuscaroras there have been sales of Navajo at 35c.@37c.

Oriental and Miller sold at 7c.

Barcelona is quiet at 31@35c..

No sales of Eureka Cons. were made. Among the Amadors. Sutter Creek as usual has been the most active. Sales were made on Monday at $2.10 and on Tuesday at $2.25. Latterly prices have been weak, $1.75 being touched on Wednesday.

Ontario continues very firm at $34.25. Horn Silver is steady at $2.45.

Homestake was not sold during the week. Closing quotations are $7 bid. Caledonia changed hands at $1.40 to $1.50. Father de Smet is quiet at 50c. asked. Deadwood Terra sold at $1.50. Iron Hill is quiet at 35c. bid, 45c. asked.

Among the sales of miscellaneous shares during the week we note Rappahannock at 5c. to 6c.; Mutual Smelting & Mining Co., at $1.50 to $1.60, and Silver Mining of Lehigh Valley at 35c.

Anxious investors have renewed their inquiries of late as to the present status of the Shoshone, Castle Creek, and Deer Creek enterprises, in which Mr. J. E. Hall, who has forsaken his accustomed resorts, was the moving spirit. These companies, among others should receive the early attention of the Committee on Mining Securities. The committee, under Chairman Macpherson, started out quite bravely last summer to correct some of the existing evils) but after about a dozen more or less satisfactory reports were received from varions semi-dormant companies on the list. But before long the committee relaxed its efforts and now has apparently relapsed into a state of philosophical resignation which does not tend to increase the business in the mining share market.

Brunswick has apparently disappeared from the active list for the present. We presume that the stock in the new company held by its promoters will make its appearance on the market shortly.

The promoters of the new company advertise that the time for receiving stock has been extended to Feb. 22d. This would seem to indicate that the stockholders are not very greatly pleased with the plan which contemplates locking their stock up until August next, to give the promoters an opportunity to manipulate the market and dispose of their own interests, the assessment money in the meantime, paying for the working of the mine. As the amount thus raised will be very small, further working capital will have to be provided by further assessment.

This has probably deterred many stockholders from joining in the pooling arrangement in which some of them think the benefits are in fact rather one sided, though, on the other hand, the option is to lose their stock altogether.

Sales of Astoria are recorded at 7@8c.

Quicksilver preferred sold at $35.50@$36.50, and common at $36.50.

The Bodie Camp is represented by sales of Bodie Consolidated, 42@50c, Bulwer at 25c.; Mono, 45c.

Boston. Feb. 6.

(From our Special Correspondent.)

The market the past week has not been a very satisfactory one, the prevailing characteristic being extreme dullness, added to a slight decline in prices, which has tended to restrict business. The demand for ingot copper has fallen off somewhat, and the lower price in London may account for the

decline in the stock market, although the conditions all point to a great activity in the future, but for the time being speculation is at a standstill, and prices may be somewhat lower before the actual bull market sets in. Calumet & Hecla advanced to $260, but lost the advance and sold down to $255 on small dealings.

Tamarack is stronger, advancing from $156@$161, and holds the advance.

Boston & Montana sold up to $48¼ on early dealings, but declined to $46 to-day. The product of the mine shows some falling off, but its friends are sanguine of the future.

Quincy is dull, but steady at $70½@$71.

Osceola opened at $29, ex-dividend, and has steadily declined under the pressure to sell stock to $26, although the outlook at the mine was never more encouraging. A disposition to take profits by parties who bought at low price accounts for the reaction.

Franklin touched $13½, but rallied to $14¼, and is in fair demand

Atlantic steady, at about $14.

Kearsarge has been quite strong and active, selling to $10⅝ and reacting to $10.

There has been considerable selling of Butte & Boston, resulting in a decline to $12½, or 50 per cent. of the par value. If all the good things which have been said of this mine be true, the stock should be a great purchase at this price.

Allouez has been dull, but very steady, at $1.95@$2.

Santa Fe declined to $1¼, and sold to-day at $1.30. The speculation in this stock seems to have subsided for the present.

Pewabic sold at $8½, and Bonanza at 90c.

The Centennial, formerly the Schoolcraft, has been listed on the Stock Exchange, and called for the first time to-day, a small lot selling at $28.

The company is opening the Calumet & Hecla vein, which crosses a square mile of land owned by this company, and extends over a mile in length on this property. The company is capitalized with 80,000 shares, par value of $25, and has $298,000 of available cash assets for development and equipment. The stock was originally put on the market at $15 per share.

Silver stocks continue dull. Dunkin is a little firmer with sales at 70c. and 65c.

Napa quicksilver steady at 4½c.

Breece is in demand and sold at 35c.

3 P. M.—The market was better this afternoon. Boston & Montana sold up to $46¾. Butte & B. advanced from $12½ to $13¼ and $13⅝, buyer 60. Kearsarge steady at $10. Osceola advanced from $26 to $28¼, closing strong at the advance. Santa Fé declined to $1.27½ and Tamarack to $159¾.

Lake Superior Gold and Iron Stocks.

(Special Report by David M. Ford, Houghton, Mich.)

There is nothing special to report in the prices of these stocks except that they show an upward tendency, as is shown by the Ashland Iron Company, which has advanced from $65 last week to $75 this week; the Chandler Iron Company, the Norrie and Odanah Iron Companies, which have gone up several points over last week's quotations. At the Michigan gold mine, the small Huntington mill has been started and twenty-eight tons of quartz milled, of which 16 tons were taken from the dump near the surface in sinking the deep shaft; the other 12 tons were taken from near the bottom of the same shaft; none of this rock showed any gold to the eye. A cleaning up was made on February 1st, the amalgam retorted leaving a button of gold, weighing 28⅞ pounds avordupois; the assay value of which is about $8,400. This yield from 28 tons of the common quartz (none of the rich rock having been put in), tends to show that the Lake Superior region possesses rich gold mines. This has been the cause of the rise in this company's stock, which has advanced from $3 to $4.

GOLD MINING STOCKS.

Name of Company	Par value.	Lowest.	High.
Grayling Gold & Silver Co.	$25.00	$0.90	$1.00
Michigan Gold Co.	25.00	3.00	4.00
Peninsula Gold & Silver Co.	25.00	.75	.90
Ropes Gold & Silver Co.	25.00	2.25	2.50

IRON MINING STOCKS.

Name of company.	Par value.	Bid.	Asked.
Ashland Iron Co.	$25.00	.....	$75.00
Aurora Iron Co.	25 00	.....	8.25
Champion Iron Co.	25 00	$105.00	110.00
Chandler Iron Co.	25.00	44.50	46.00
Chapin Iron Mining Co.	25.00	25.00	33.00
Chicago & Minn. Ore Co.	100.00	120.00	130.00
Cleveland Iron Co.	25.00	19.00	20.00
Germania	25.00	.....	11.00
Jackson Iron Co.	25.00	110.00	120 00
Lake Superior Iron Co.	25 00	62.50	66.00
Milwaukee Iron Co.	25.00	6.00	8.00
Minnesota Iron Co.	100.00	80.0	85.00
Montreal Iron Co.	25.00	.....	12.00
Norrie (Metropolitan)	25.00	.....	85.00
Odanah Iron Co	25.00	.....	20.00
Pittsburg Lake Angeline Co.	25.00	165.00	175.00
Republic Iron Co.	25.00	49.00	52.50

PIPE LINE CERTIFICATES.

(Specially Reported by Messrs. WATSON & GIBSON.)

The petroleum market this week has been stronger, but it has not been active; the consumption still continues about 20,000 barrels in excess of the production, but so far the speculative world holds aloof from the market.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 1	105⅛	105¾	105⅛	105½	73,000
3	105¾	106⅜	105	105	151,000
4	105¼	105¾	104¾	105⅛	308,000
5	105⅝	107	105⅛	106⅞	198,000
6	107	107	106⅝	105⅝	111,000
7	106⅜	107	106¼	106¾	171,000
Total sales in barrels					1,012,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 1	105¼	106¾	105¼	106⅛	143,000
3	106¼	106½	105	105¼	306.000
4	105⅝	105⅞	104⅝	105⅝	248,000
5	105¾	107⅛	105½	107⅛	417,000
6	108	108	106¼	106⅞	221,000
7	106⅞	107⅜	106½	107⅛	219,000
Total sales in barrels					1,554,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 7.

Statistics.

Mr. John H. Jones, chief of the Bureau of Anthracite Coal Statistics, furnishes us the following statement of shipments of anthracite coal (approximated) for the week ending February 1st, 1890, compared with the same period last year:

Regions.	Feb. 1, 1890.	Feb. 2, 1889.	Difference.
Wyoming Region. Tons	237,092	289,910	Dec. 52,818
Lehigh Region ... "	107,457	74,293	Inc. 33,164
Schuylkill Region. "	167,898	174,885	Dec. 6,987
Total	512,447	539,094	Dec. 26,647
Total for year to date	2,446,776	2,766,742	Dec. 819,966

PRODUCTION OF BITUMINOUS COAL for week ended January 25th and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

Tons of 2,240 lbs.	1890. Week.	1890. Year.	1889. Year.
Phila. & Erie R.R.	2,964	13,578	8,378
Cumberland, Md.	97,275	396,313	275,619
Barclay, Pa.	2,924	9,599	14,414
Broad Top, Pa.	13,011	54,296	44,947
Clearfield, Pa.	80,499	393,960	342,954
Allegheny, Pa.	22,729	103,492	92,936
Beach Creek, Pa.	47,795	149,740	128,454
Pocahontas Flat Top.	39,690	170,287	125,476
Kanawha, W. Va.	*40,256	178,015	146,532
Total	347,143	1,479,190	1,179,710

* Week ending January 21st.

WESTERN SHIPMENTS.

Pittsburg, Pa	15,260	81,953	60,558
Westmoreland, Pa.	42,470	168,951	170,856
Monongahela, Pa.	5,614	24,480	15,206
Total	63,344	275,384	246,620
Grand total	410,487	1,754,574	1,426,330

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending February 1st, and year from January 1st, in tons of 2,000 lbs.: Week, 127,836 tons; year, 529,976 tons: to corresponding date in 1889, 440,665.

The production of anthracite coal on the line of the Pennsylvania Railroad for the year ending December 31st, 1889, in tons of 2,240 lbs., was 3,136,178 tons.

Anthracite.

Following the announcement that the presidents of the various anthracite carrying roads have held a more or less satisfactory pow-wow, comes the information that all the general sales agents met in Philadelphia yesterday, discussed the condition of trade and plans for the future and adjourned until the 13th of the month. The meeting was apparently harmonious, and plans are being formulated which those interested hope will tend to produce a more satisfactory condition of affairs in the coal trade next year. At this juncture, it is, of course, essential that secrecy as to the nature of these plans should be preserved. In certain quarters, however, the belief obtains that the present depressed state of the market, as well as discouragement over the repeated failures to maintain agreements, has induced the producing powers to contemplate a combination of a very strong character, in sympathy perhaps with the similar tendency in other industries.

It is to be hoped that the teachings of experience will be duly heeded by those who are now arranging for the control of the coal trade next season. All forms of combination have been tried and none have been successful. One influential company has steadily refused to participate in any such arrangement. Arbitrary prices have been fixed, and broken pledges of all kinds from heavy monetary forfeitures to the "honor of a gentleman" have been involved.

The only course that is plainly open to the anthracite managers is to pursue simple business methods. Restrict production to the country's needs at the various periods of the year, and then prices will naturally right themselves. The worst place for an accumulation of coal is in the market. Keep the coal in the ground until it can be assured of a wide distribution.

There was altogether too much coal mined in January. Nearly 2,500,000 tons, as will be seen by the statement at the head of this column, were shipped. This is only 500,000 tons less than what was allowed for the fall months, when consumption is ordinarily at its height. Stocks at tidewater have therefore increased to about 1,200,000 tons, the greatest accumulation at this season yet recorded.

The demand for pea coal has been rather easier this week, but it is still very scarce. About $3.00 per ton is probably a fair quotation.

The Pennsylvania Railroad Company reports shipments of anthracite coal originating on its lines east of Pittsburg and Erie for the year 1889 aggregating 3,136,175 tons.

Bituminous.

The producers of soft coal with one exception have promised to extend the agreement of December 20th last, which was to have expired on February 1st to February 20th. Unfortunately, all the signatures to this extension were not obtained until a few days after Saturday last, the 1st inst., and during this interval of two or three days certain producers claim to have made contracts for coal which will have to be protected and the carrying out of which contracts may conflict with the restrictions of the proposed combination. As a matter of fact, offerings of soft coal for next season have been very plentiful, and no doubt a number of contracts have been closed. Under these circumstances, as has been done year after year, the prospects of a firm combination being successfully formed are therefore not encouraging. Locally, during the week, no new features of interest have developed.

Boston. Feb. 6.

[From our Special Correspondent.]

The anthracite coal market presents a weak appearance. I should say that $4 was now an outside price, for stove coal and good coal, though perhaps not of the best companies, can be had at $3.90 f.o.b. At New York egg coal is quoted at $3.50@$3.75 and broken at $3.65. The relatively high price of broken is owing to the fact that the large sizes of anthracite are in fairly good demand. The calls from the iron business are excellent, and if it were not for this manufacturing demand for anthracite the whole market would be in bad shape, as domestic sizes have been a constant drag upon the companies for several months. The stocks of domestic sizes are constantly increasing, and the amount mined thus far in 1890 is larger than the conditions of trade warrant. It will not be surprising if opening prices are made upon a basis very close to $4 f.o.b. at New York for stove coal.

The bituminous market is dull. All kinds of soft coal are again in fair supply. It is claimed that there will be no more trouble at Baltimore this season in shipping on contracts, but some assert that the improved rail facilities arise from taking cars and motive power away from the grain trade temporarily, and that there will be trouble again very soon. However that may be, shippers have been glad to get coal along, and contracts are now in good shape as to delivery. No serious inconvenience will be experienced this season by any of our leading consumers. Spot cargoes and cargoes afloat are not taken as readily as they were two weeks ago, which is an indication that pressing needs are supplied.

I hear of no contract business for 1890-91, and if any "arrangements" have been made they have not yet leaked out. All sales are supposed to be for delivery before March 1st, and it is now reported that new prices will not be made before February 20th. No one here seems to know what to expect of the trust talk which has been indulged in, and the general feeling toward the trust in iron is one of skepticism. The all-rail business does not decline, now that the railroads have more traffic to handle; on the contrary, more all-rail coal comes into New England than ever before. It is claimed that now that the Poughkeepsie bridge is finished there will be a larger all-rail coal traffic to New England than ever, both of anthracite and bituminous. Prices on cargo lots of bituminous range from $2.45 to $2.55 f. o. b.

The freight situation is a little more favorable to shippers, quoting a New York rate of 85c. to 90c. Very little is coming from Philadelphia. Baltimore rate is still $1.60.

Retail trade is very moderate. Prices are unchanged, however, and probably no change will be made now or until after opening prices are announced by the companies. No one has got rich on this year's retail business, but there have been no failures in this line.

Receipts for the week have been as follows:

	For the week- 1890. Tons.	For the week- 1889. Tons.	Since Jan. 1st- 1890. Tons.	Since Jan. 1st- 1889. Tons.
Anthracite	19,857	13,294	75,463	68,917
Bituminous	12,077	5,955	44,078	78,810
Total	31,934	19,249	119,541	147,727

Buffalo. Feb. 6.

[From our Special Correspondent.]

To equalize matters the lengthy statistical communication of last week will necessitate, from exhaustion of materials, a short screed this week.

In the absence of any changes in the supply, or

demand and prices of anthracite coal, and only a light supply with firm market for bituminous coal, the one item of interest to record is the munificent benefaction of Mr. J. J. Albright, of this city, in conjunction with other members of his family, to the city of Scranton, Pa., of the value of $100,000. The heirs of Mr. Joseph J. Albright, of Scranton, wishing to perpetuate their parents' memory, have presented the "old homestead" to the city, and Mr. J. J. Albright will erect thereon a building suitable for library purposes, which will be included in the gift. The structure will cost from $50,000 to $65,000, and will be known as the "Albright Memorial Building." It is almost superfluous to say that the surprise was most heartily welcomed. The location is an ideal spot for the purposes intended. Until the Legislature authorizes the city to accept the gift the property will be held by trustees. A subscription has already been started to purchase $25,000 worth of books.

The Car Service Association has held several open meetings at which our coal men have appeared to state their grievances relative to certain methods of procedure enforced in the rules, and made points for future consideration. Manager Van Etten will give the matters due attention and will doubtless come to a satisfactory determination agreeable to all concerned.

Pittsburg. Feb. 6.

(From our Special Correspondent.]

Coal.—The situation shows no particular change, rivers in good navigable order and the coal is shipped to the lower markets as fast as loaded. Total for January, 11,600,000 bushels, the principle portion being for the markets below Cairo.

The nominal assets are:

	Per 100 bushels.		Per 100 bushels.
1st pool	$4.75	3d pool	$3.90
2d pool	4.50	4th pool	3.25

Railroad coal, $5 20@$5.50.

Connellsville Coke.—The coke scales discussion is now going on at Scottdale. So far nothing has been learned in regard to the proceeding. Public opinion is that there will be sufficient concessions made to prevent a strike. Week's shipments, 7,710 cars; previous week, 7,300; increase, 410 cars. Week's tonnage, 141,652 tons; previous week, 141,943; decrease, 291 tons; operation and output, 13,920; active ovens, and 621 idle; previous week, 13,918 active and 623 idle.

Quoted rates are: Furnace, f. o. b., $1.75; foundry, $2.05; crushed, $2.55.

Freights.—Shipments, 70c.; Mahoning and Shenango valleys, $1.35; St. Louis, $3.65; Chicago, $2.75; Cleveland, $1.70.

FREIGHTS.

From Baltimore to: Boston, Mass., 1.60; Charleston, 1.00; Fall River, 1.40; Galveston, 3.00; New Bedford, 1.40; New Haven, 1.40; New London, 1.40; New York, N. Y., 1.10; Portsmouth N. H., 1.60; Providence, 1.40; Salem, Mass., 1.60; Savannah, 1.15; Somerset, 1.40; Williamsburgh, N. Y., 1.10.

* And discharging. † Alongside. ‡ And towage.

METAL MARKET.

NEW YORK, Friday Evening, Feb. 7.

Prices of silver per ounce troy.

Feb.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.	Feb.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
1	4.87	44⅝	97⅜	5	4.87	44 5-16	96⅝
3	4.87	44½	97⅛	6	4 86½	44 5-16	96⅝
4	4.87	44½	97	7	4.86¼	44⅜	96¾

The silver market has proved very weak and dull this week, London quotations being mostly nominal. There was no allotment of council bills last Wednesday. The recent fluctuations and sudden withdrawal of London orders gives ground for the belief that the market is manipulated by English buyers.

United States Assay Office at New York reports total receipts of silver for the week, 80,000 ounces.

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked
Trade dollars	$ .76	$ 78
Mexican dollars	.76½	.77½
Peruvian soles and Chilian pesos	.72	.73½
English silver	4.83	4.88
Five francs	.94	.95
Victoria sovereigns	4.85	4.88
Twenty francs	3.85	3.90
Twenty marks	4.74	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.82	4.88
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00

Copper.—There is nothing of much interest to report about the copper market during the past week. On the whole the tone has been quiet but steady, and values have been fairly sustained. Some 500 lots of Lake copper have been sold somewhat below 14½c., but the producing companies still hold firmly for that figure. To-day one small transaction at 14·15 for April Lake copper is reported, but this must not be regarded as criterion.

Deliveries continued at a satisfactory rate and the demand for casting copper also very fair. For casting brands the present quotation is 12¾@13c., and for Arizona copper 13¼@13½c., which prices are certainly cheap in comparison with the quotations for Lake copper.

The European markets are steady as a rule, but the London market for Chili bars and G.M.B.s has eased off somewhat during the week, and the latest closing quotations are £48 10s.@£48 12s. 6d. spot, and £49@£49 5s. three months.

For refined and manufactured sorts no alteration in values has to be reported, but advices to hand recently state that for the finer kinds especially a good demand continues at full pr ces.

Cable advices received from Europe report that for the second half of January the statistics of visible supplies show a decrease of 1,300 tons, which is regarded as very satisfactory.

We are advised from Paris that "the Liquidators of the *Société des Metaux* are continuing manufacturing and trading for account of whom it may concern, nobody being willing to pay 30,000,000 francs for the different works, plants, *fonds de commerce*, etc. Nothing has yet indicated the intention of the president of the *Tribunal de Commerce* as to the reorganization of the company by its former stockholders, though by this time the status of the Comptoir d'Escompte in liquidation must be definately settled."

Tin.—The course of the market has been very irregular. After our last report prices continued to advance until 21·35 and 21·40 was paid for prompt and near deliveries, but on Monday a decidedly weaker tendency became manifest and the down ward movement has continued during the whole of the week, and we close at about the lowest figures, viz.: Spot, 20¾; February, 20¾; March, 20¾.

The London market has also suffered a sharp relapse, owing, it is understood, to heavy shipments from the East, which are still continuing. The closing quotations last week were £95 15s.@£94 17s. 1d. spot, and £95 10s.@£95 12s. 1d. futures, while according to latest cable advices the market closed to-day (Friday) at £92 10s.@£92 12s. 6d. spot, and £935s.@£93 10s. three months.

Lead.—The lead market has remained during the entire week in an almost stagnant state, and during the whole time the total transactions have not exceeded a few hundred tons, which changed hands at 3·85. At a little below that figure, however, there are buyers. Owing to the fact that no lead is actually pressing on the market, prices have been pretty well sustained, which, considering the very limited business doing, could not otherwise have been the case.

It is understood that negotiations continue for the consolidation of the lead smelting works by sale and a single company. This is not called a *Trust*.

The London market has declined a little during the week, the latest quotations there being £12 17s. 6d. for Spanish and £13 2s. 6d. for English lead.

The St. Louis Market.—Messrs. John Wahl & Co. telegraph us as follows: "There have been no developments of a positive type to influence values of lead since our last report. It's the same old story. Buyers have no trouble in buying all the common lead wanted at 3.57½c., and argentiferous at 3.60@3.62½c. There seems to be little desire to trade in futures."

The Chicago Market.—Messrs. Everett & Post telegraph us as follows: "The market through the week has been fairly steady, and very little lead is being offered on account of scarcity of material. Sales during the week will aggregate about 500 tons. The market closes steady with 3·65c. bid for February and 3·67½c. asked."

Spelter.—The market continues dull at $5.30@$5.35. for prime Western.

The European markets are also reported as flat, and in London quotations have declined to £22 for ordinaries and £22 5s. for specials.

Antimony.—Cookson's remains steady at 29@30c., but Hallett's (of which brand some shipments have recently arrived) has been sold at 19⅞@20¼c. The demand continues good and firm reports are still sent from Europe, though it is reported that ores are being shipped to England from all parts of the world, the high prices having stimulated the opening of new mines. It is not improbable, therefore, that before long these increased supplies will cause a decline in the market

Quicksilver.—The local market shows a somewhat firmer tone, at unchanged quotations. London cables quote £9 15s., and $49.50 is still the ruling price here.

Nickel.—Recent large importations against a lighter demand has caused a weakening of quotations which are now about 75c.per pound. During January there was imported at New York 42,660 pounds of nickel as compared with 31,500 pounds in December, and 32,240 pounds in January, 1889.

Importations for the current week aggregage 5,000 pounds.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 7.

Pig Iron.—There continues to be only a limited demand for pig iron, and it is not at all unfair to call the market dull; but, so far as can be learned, no appreciable weakening of prices has ensued. Freight rates to New York on Southern irons have been advanced to $4.36 from Alabama furnaces, an advance of 25c. per ton. The freight to Providence from the same points is now $4.60. Standard grades of No. 1 X foundry may be quoted at $19.50@$20 50. No. 2 X foundry, $18.50@$19.50, and gray forge at $18. Very little is being done in "warrants," which are quoted nominally at $18.50 on the spot and $19 for March and April delivery.

Scotch Pig.—The Glasgow market continues to decline. Latest quotations for Scotch warrants to-day being 52s. 10d. Local importers are still inclined to attribute the weakness in the market to speculative influences. The large operators, it is believed, have realized pretty generally, and will let the market alone until a further decline is witnessed. A prediction is made that if warrants reach 49 or 50 shillings, and trade conditions permit, another boom will then be inaugurated which will carry values much higher than they have reached during the year. According to latest cables, however, the demand is not so brisk as formerly.

The New York Metal Exchange states that the imports of pig iron at this port during the month of January were only 300 tons, as compared with 880 tons during December, 1889, and 3,397 tons during January, 1889, the corresponding month last year. The stock in store here is estimated at 2,386 tons, as compared with 2,485 tons a month ago.

Concerning the English market, a correspondent writes us from Manchester under date of January 25th as follows: "The course of business in the metal markets during the month has been very disappointing. Pig iron, which stood very firm, has almost continuously lost ground, a total fall of 5s. 6d. per ton at Glasgow and of 6s. per ton at Middlesborough having been recorded. This is due to the action of speculators: makers have not been taking the lowest figures, as they have plenty of orders booked for forward delivery, and are confident that prices will improve again; indeed, during the last three days there is a slight recovery. Shipments from Middlesborough during the month are only moderate, being returned as 19,065 tons up to the 13th inst. Matters are somewhat quieter in manufactured iron, but there is still a fair inquiry, and prices are firm."

Speigeleisen and Ferro-Manganese.—Little business of importance is pending in this line at present. Foreign furnaces quote an equivalent to $39 for June delivery here. It is possible that for smaller lots held here, upon which holders seem willing to realize, a slightly lower figure will be accepted. For ferro-manganese, 80 per cent., about $99 may be quoted, as there have been offerings at that figure. The cost of importation at present, according to the latest cable quotations, is $105. The imports of spiegeleisen in January aggregated 8,254 tons, as compared with 6,323 tons in January, 1889.

Steel Rails.—While the market continues very quiet, so far as business is concerned, apparently no one is pressing the market to effect sales, and we have yet to hear of any quotation below $35 at mill. Some of the mills, in fact, adhere firmly to the $36 quotation, but in view of the fact that there nas been no business of importance to test values, the price, to a certain extent, must be considered nominal.

All of the mills, with possibly one exception, are comfortably filled with orders, booked before the close of the last year. How long these orders will lead them to maintain the advanced price is a matter of judgment on the part of the mill owners, and this will be largely influenced by the course of the crude iron market during the next 30 or 60 days.

Sales include 3,000 tons to the West Shore and 5,000 to the Alabama Midland.

Structural Iron and Steel.—Trade continues quiet, without new features of interest. In the way of big contracts there is little or nothing doing. Ruling prices are as follows:

Delivered on wharf, bridge plate, 2·40c.; iron angles, 2·40c.; iron tees, 2·80@2·85c.; steel angles 2·70c.; beams and channels on wharf, 3·1c.

Steel plates on wharf: Tank and ship, 2·75c.; shell, 3.10c.; flange, 3·25c.; fire-box, 4·25c.

Iron plates on wharf: Common tank, 2·35c.; refined, 2·45c; shell, 2·6c.; flange, 3·5@3·7c.; extra flange, 3¾@4c.

Bar iron at mill is quoted at 1·8@1·9c. for common and 1·9@2c. for refined. Deliveries from store are quoted as follows: Common, 2·1c. base; refined, 2·3c. base; "Ulster," 3.10c. base; Norway bars, 4·25c.; shapes, 5·25c., and Norway nail rods, 5·72c.

Merchant Steel.—Prices are as follows: Best English tool steel, 15c. net; American tool steel, 8@10c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3¾c.; open-hearth machinery, 2¾c.; open-hearth spring, 2¾c.; tire steel, 2¾c.

Pipes and Tubes.—According to the revised schedule, rates of discount on wrought-iron pipe are as follows: Butt welded, plain

and tarred, 47½ per cent. discount; galvanized, 40 per cent. discount; lap-welded, plain and tarred, 60 per cent. discount; galvanized, 47½ per cent. discount. A discount of 52½ per cent. is allowed on boiler tubes of 4 inches and larger, 50 per cent. on tubes from 2 to 4 inches, and 45 per cent. on 1¾ inches and smaller.

Cast-iron pipes remain at $25@$28, according to size.

Rail Fastenings.—Asking prices are about as follows: Spikes, 2:25c.; angle fish plates, 2.15@2.25c.; bolts and square nuts, 3c.; hex nuts. 3:25c.

Old Material.—The only feature apparent in this market this week has been a reported offering, at low prices, of a lot of 1,800 tons of old iron rails bound for this port. This lot consists of 700 tons of tees and 1,100 tons of doubles. It has been held by Calcutta parties for a number of years, and for some time past has been frequently offered in this market, but within the week we have not been able to learn that it has been actually offered here. Since it has been afloat a report has been current n some quarters that it has been sold for San Francisco delivery, but the latest rumor suggests the possibility that it may be either sold here or received here and then shipped to England. The reason that so much importance is attached to this offering at present is, that owing to the peculiar condition of the market and the rather wide diversity of buyers' and sellers' views, any decided pressure to sell might have a pronounced weakening effect, upon values. The lot referred to is held by bankers here. Otherwise there has been no pressure to sell old rails during the week. All the stock here is held in strong hands, and holders believe that by a month or six weeks more old material buyers will necessarily be in the market for fresh supplies. At present the rolling mills seem to have a pretty fair stock of material on hand and are not disposed to accept anything more unless on material concessions on the part of sellers. The foreign market for old rails continues very firm. We are informed that at a recent government sale in Belgium of a lot of 6,000 tons of old rails, a figure equivalent to $23 per ton was realized. With freight, duty, and other expenses added, it would have cost at least $31 or $32 to have these rails delivered here.

According to the statistics of the Metal Exchange, but 246 tons of old rails were imported during January, 1890, against 1,122 tons imported during January, 1889. For old tees $28.50 is the usual asking price, but we can learn of no bids higher than $27.50. No. 1 wrought scrap iron is still quoted at $24.

Louisville. Feb. 4.

(Special report by Messrs. HALL BROS. & Co.)

The same general conditions prevail, sales have been comparatively light though more frequent, and the aggregate tonnage foots up well. Furnace companies are offering comparatively light quantities, and the trade are buying in about the same way. Prices have fluctuated according to the temper of the sellers.

Hot Blast Foundry Irons.

Southern Coke	No. 1	$19.00@$19.50.
" "	No. 2	18.75@ 19.00.
" "	No. 3	18.00@ 18.75.
Mahoning Valley, Lake ore mixture		20.00
Southern Charcoal	No. 1	18.50@ 19.00.
" "	No. 2	18.00@ 18.50.
Missouri "	No. 1	19.50@ 20.00.
" "	No. 2	19.00@ 19.50.

Forge Irons.

Neutral Coke	17.50@ 18.00.
Cold Short	16.75@ 17.00.
Mottled	15.50@ 16.00.

Car Wheel and Malleable Irons.

Southern (standard brands)	23.50@ 24.50
" (other brands)	19.50@ 20.50.
Lake Superior	23.00@ 23.50

Philadelphia. Feb. 6.

(From our Special Correspondent.)

Pig Iron.—The Eastern Pennsylvania iron trade has not shown any symptoms of the predicted improvement, but the present situation is satisfactory to both sides; to buyers, because prices are not advancing, and to makers, because the production is all absorbed. So far as the judgment of the best informed in the trade can penetrate the future, there will be no overproduction for three or four months to come; on the other hand, the possibility of a deficiency in stocks is contemplated by not a few very high authorities. Considerable attention has been given to the attempts of two or three Southern companies to make a market for their product here; but these efforts are so trifling and the amount of iron at their command for this purpose is so insignificant, that our people look upon the movement as unimportant. Besides, the quotations which have been named for Southern brands to buyers here afford very little inducement for taking hold. Current quotations for No. 1 foundry iron are $19.50@$20.50; No. 2, $18.50@ $19; gray forge, $17.50@$18. Those makers who are oversold, or who have only standard or special brands of iron to sell, deny the statements so frequently made to the effect that the market has a weakening tendency; they claim with earnestness, and apparently with good reason, that the market is strong and the consumptive requirements such as to keep prices about where they now are.

Foreign Material.—Concessions amounting to 50c. have been made in spiegeleisen, but buyers think this is not the full extent of the probable decline. Several offers have been made, but not accepted. It is rumored that $36.50 has been named, but $38.50 is the asking price. Ferromanganese is quoted at $85 for 70 per cent.

Billets and Blooms.—Quotations for billets today are $37.50 to $38; nail slabs, $37 delivered. Several small lots have sold, and negotiations are now pending for two or three large round lots. Charcoal blooms are strong at $55; anthracite, $45; scrap, $36.

Muck Bars.—The activity in muck bars during the past week has enabled makers to hold prices firmly at $32.50 to $33.

Merchant Iron.—The car builders' requirements have been presented quite liberally during the past few days, and quotations are 1·85, with offers made at 1·75 to 1·80. There are no stocks at mills, but orders are running rather low, and manufacturers are anxious to secure the large business that has been talked about. Several large consumers are waiting to see whether the market will not weaken. Refined bars are 1·95 at mill.

Skelp Iron.—Grooved skelp is quoted at 1·95, and sheared at 2·15. Several offers are in at 1·85 and 2c. Buyers think the situation in their favor, and expect these offers to be accepted before Saturday.

Sheet Iron.—The sheet iron market is very strong, and the mills are supplied with about as much business as they are capable of executing. Quotations for refined, 3·10 to 3·70 according to gauge; soft steel, 3½ to 4½c. There is an active inquiry for galvanized for spring delivery; discounts are 60 to 62½ per cent. off, according to quality.

Nails.—Several large buyers have concluded that this is about as good a time to secure stocks for the spring as any other, and have placed orders with interior mills, it is reported on the street here, at $2 in carload lots. This quotation is denied, but it appears that there is some quiet shading going on. A very heavy demand is soon expected.

Wrought Iron Pipe.—All the mills making pipes and tubes are kept busy, full time, to cover the increasing demand from the buyers of pipes and tubes, but especially the latter. A great deal of machinery for steam purposes is being ordered.

Plate and Tank Iron.—The past week has been an unusually dull one among the plate iron makers, and for no reason that they are able to assign. Although business is quiet, prices are very firm. Quotations, 2·30 for tank and 3·75 for fire box. Steel tank, 2·65; flange, 3·25.

Structural Iron.—Expectations are very high, concerning the amount of business likely to be secured for the spring and summer. Negotiations were started early this week with certain large buyers who will be in the market soon, and it is rumored to-day that quotations named on these requirements will show a shading of fully one-tenth. As the orders are exceptionally large, the rumor seems a reasonable one. For ordinary lots, quotations for bridge plate are 2·40; angles, 2·30; tees, 2·80; beams, 3·10.

Steel Rails.—Reports received to-day from mills in the interior are rather contradictory. Brokers who have been endeavoring to place business claim that the mills are disposed to shade a little for a large lot, but not for small business. Quotations are continued at $35 to $36. From the most reliable information obtainable, the statement is authorized that there has only been a moderate amount of business this week. Brokers and makers intimate that there will be some heavy transactions at an early day; but this story is by no means a new one.

Old Rails.—Quotations, $28@$28.50. Several lots recently arrived are virtually held at auction prices, and bids are now in order.

Scrap.—No. 1 scrap is strong at $25; machinery scrap can be had at $17; wrought turnings, $16.50; cast borings, $11@$12. Fish plates are nominally $29; car wheels, nominally $18.50.

Pittsburg. Feb. 6.

(From our Special Correspondent.)

Raw Iron.—We have to report a dull and unsatisfactory market; buyers have made up their minds not to pay rates that were current at date of last report, therefore sales have been few and some distance apart. Some sellers, however, are willing to shade prices in order to effect sales. In regard to the iron business there are several matters to be taken into consideration; the raw iron sales reported in this Journal for 1889, reached the enormous amount of 1,923,050 tons. The sales reported for October, November and December, amounted to 723,280 tons. It may be as well to bear the fact in mind that a large portion of this iron was for delivery during the first quarter of the present year, and is now being delivered, making things healthy for consumers, who were among the large purchasers during the period named. As usual on such occasions, there is a wide difference of opinion in regard to the present and future of the iron trade. Although wide apart, each party are entitled to their views. So far the sales of raw iron have been liberal as compared with former years, as the following are the sales for January for the past three years.

	1888.	1889.	1890.
January 7	11,440	23,970	50,225
" 14	11,135	15,153	37,890
" 21	9,300	13,875	32,500
" 28	8,335	13,215	21,335
Total tons	40,210	66,213	141,950

When the extreme dullness of the iron trade is mentioned, a glance at the above figures will show that business has been remarkably good compared with former years. The sales the past four months aggregate 865,230 tons. A few years ago that amount would have been considered a good year's business.

In view of the enormous transactions noted during the past four months, the paucity of demand should cause no surprise. This opinion being confirmed by light offerings, showing that, as regards supply and demand, the proportion is very evenly balanced.

The point which every one in the trade is anxious to arrive at is the ultimate result. Will prices be maintained, or will a new range of figures have to be adopted? A careful inquiry among consumers developed the fact that most of them are receiving iron and steel on old contracts, at from one to two dollars per ton below present rates, and until these are completed it will be difficult to reconcile them to the advanced prices. Of course, these contracts must end, and every day brings the end nearer.

Coal and Coke Smelted Lake Ore.

1,000 Tons Bessemer	$23.35 cash.
1,000 Tons No. 1 Bessemer	24.00 cash.
1,000 Tons Gray Forge	18.00 cash.
750 Tons No. 1 Mill	18.25 cash.
500 Tons Mill (valley) February-March	17.40 cash.
500 Tons Mill No. 1 Extra	18.50 cash.
500 Tons Bessemer	23.35 cash.
500 Tons Bessemer	23.30 cash.
500 Tons Mottled	17.25 cash.
200 Tons No. 1 Foundry	19.75 cash.
100 Tons No. 2 Foundry	19.00 cash.
100 Tons Mill Iron	17.95 cash.

Coke, Native Ore.

75 Tons Silvery	18.50 cash.
60 Tons No. 2 Foundry	19.00 cash

Muck Bar.

750 Tons February—March	30.25 cash.
500 Tons Neutral	30.25 cash.
250 Tons February	30.50 cash.

Steel Slabs and Billets.

1,000 Tons Billets and Slabs	36.75 cash.
500 Tons Billets and Slabs	36.60 cash.
500 Tons Billets	36.00 cash.

Steel Blooms.

500 Tons Steel Blooms	36.00 cash.

Steel Wire Rods.

575 Tons American Fives	52.00 cash.

New Steel Rails.

2,500 Tons March	36.00 cash.
2,000 Tons February	36.00 cash.

Bloom Ends.

1,000 Tons Bloom Ends	26.00 cash.
500 Tons Bloom Ends	26.00 cash.

Skelp Iron.

500 Tons Sheared	2.20 4 mo.
275 Tons Narrow Grooved	1.82½ 4 mo.
125 Tons Wide Grooved	1.90 4 mo.

Ferro-Manganese.

100 Tons 80 per cent., Seaboard	100.00 cash.
100 Tons 80 per cent., Seaboard	96.50 cash.
50 Tons 80 per cent., Pittsburg	103.00 cash.

Old Iron and Steel Rails.

800 Tons American Ts	27.00 cash.
500 Tons " "	28.00 cash.

Scrap Material.

250 Tons No. 1 Wrought Scrap, net	25.00 cash.
250 Tons Leaf Steel, net	25.00 cash.
200 Tons Iron Axles, net	30 00 cash.
150 Tons Crucible Steel, net	30.00 cash.
100 Tons O. H. Steel, gross	24.50 cash.
50 Tons Steel Axles, net	30.00 cash.

Prices.

Coke or Bituminous Pig—		20% Spiegel at Pittsburg	40.00@41.00
Foundry No. 1	$20.00@20.25	Muck-Bar	30.00@30.50
Foundry No. 2	19.00@19.25	Steel Blooms	35.50@36.75
Gray F. No. 3	18.00@18.25	Steel Slabs	36.00@36.50
" No. 4	17.50@	Steel Cr'p Ends	25.00@26.00
White	17.00@17.25	Steel Bl. Ends	25.00@26.00
Mottled	17.00@17.25	Ferro-Man., 80% seaboard	96.00@96.50
Silvery	18.25@21.00	Steel Billets	36.50@
Bessemer	23.50@23.75	Old Iron Rails	27.50@28.00
Low Phos	27.00@28.00	Old Steel Rails	23.00@24.00
Charcoal Pig—		No. 1 W. Scrap	23.00@24.00
Foundry No. 1	23.50@24.50	No. 2 W. Scrap	@19.00
Foundry No. 2	22.00@22.75	Steel Rails	36.00@36.50
Cold-Blast	25.00@29.00	" light sec	36.00@39.00
Warm Blast	24.00@25.00	Bar Iron, nom	1.90@ 1.95
10 + 12% Spiegel at seaboard	30.00@31.00	Iron Nails	2.50@ 2.30
		Steel Nails	2.50@ 2.30
		Wire Nails	2.90@3.00

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Feb. 7.

Heavy Chemicals.—Rarely has there been so strong and large demand for soda ash and alkali as of late. The supply on the spot is very light and the demand is still good. Carbonated soda ash, 48 per cent., may be quoted at about $1.45, and 58 per cent., new process, refined alkali is now held at $1.45, for March delivery. Sales of small quantities of 58 per cent. have been made as high as $1.75.

Caustic soda also shows a decided advance. For 70 and 74 per cent., $2.75 is now quoted on the spot, and foreign cables quote an equivalent to $2.65 for shipment.

Quotations for caustic soda ash, 48 per cent., are merely nominal, as there is very little business doing in this article. About $1.37½ is the ruling quotation.

Bleaching powder is slightly better than last week at unchanged quotations. From $1.45 to $1 50 are asked.

Sal soda has remained steady at 95 cents for English brands.

Hyposulphite of soda shows no animation at all at $1.50 per cwt. in casks

Acids.—The acid market continues very quiet, but the schedule prices seem to be generally maintained. Since the 1st of February there has been some slight increase in business, and makers are hopeful that the month of February will show a decided improvement over the month just closed. The prospects for a large consumption of acid this year are generally considered good. It should be remembered that the unusual activity of the latter part of 1889 was caused not so much by an abnormal demand as by the lessening of production in certain districts, which diverted the demand to other makers. Therefore, there is no reason to suppose that 1890 will be an off year, and every one expects the usual normal increase of consumption will be maintained. The consumption of acid for fertilizing purposes may not be large for the first of the year, but the oil refineries will need as much, if not more, than before, as the consumption of refined oil is showing a large increase.

The Knickerbocker Chemical Company has arranged to open offices at 81–83 Fulton street, the Fulton Market Bank Building, where the semi-monthly meetings of the New York Chemical Club were regularly held. The location is in the centre of the acid district and is conveniently accessible. Several meetings of the executive committee of the company have been held during the week.

There have been moderate transactions in oxalic acid at the continued low prices. The recent attempts to bring about an advance are characterized as the work of those who still have high-price oxalic acid on their hands, but this does not change the aspect of affairs; the combination which made its first object to restrict production being broken, it looks as though the market would be flooded by overproduction unless an unusually strong consumptive demand sets in.

Fertilizing Chemicals.—At this time of the year there should be a pretty lively demand for fertilizing materials for spring consumption; but, nevertheless, the business passing is of the hand-to-mouth order. A feeling of hesitancy characterizes the trade all the way through, from the seller of the crude material to the farmer who buys the manufactured fertilizer. Large manufacturers seem to have a moderate supply of the various necessary materials on hand, and the small makers, who ordinarily buy material as they need it, have not shown the slightest disposition to anticipate their requirements.

The discussion of Florida phosphates, their quality and their quantity, rather enlivens the dull market. A valuable paper on the subject by a well known authority, which we publish on another page, will be found particularly interesting at this juncture. Some of the samples of phosphates that have thus far been received from Florida have assayed very high, but as yet their value has not been demonstrated in this market on a commercial scale. We understand, however, that experiments are now in progress and actual results will be known before long. As yet but one Florida company has opened offices in this city for the sale of the product. This concern, we are informed, has sold 4,000 tons subject to the first cargo being satisfactory. Ruling prices are as follows: Azotine, $1.90@$2.00; dried blood, low grade, $1.85@$1.92½; high grade, $1.92½@2.00. Tankage, high grade, 9 to 10 per cent. ammonia and 15 to 20 per cent. phosphate, $20@$21 per ton, and low grade, 7 to 8 per cent. ammonia and 25 to 30 per cent. phosphate, $18.50. Fish scrap, $21.50@$22 per ton, f.o.b. factory. Sulphate of ammonia at $3.12½@$3.17½ per cwt. Concentrated tankage, $1.90@$2.00. Refuse bone-black, guaranteed 70 per cent. phosphate, $20 per ton. Dissolved bone-black is 95c. per unit for available phosphoric acid, and acid phosphate 80c. per unit for available phosphoric acid. Steamed bones, unground, $20@$23; ground, $25@$26.

Charleston rock, undried, $5.75 per ton; kiln, dried, $6.75@$7 per ton, both f.o.b. vessels at the mines. Freights by sail from Charleston to New York, $3@$3.25 per ton. Charleston rock, ground, $11.50@$12, ex-vessel at New York.

Double manure salts, 48 to 51 per cent. sulphate of potash, for 1890 shipment, $1.12½ per 100 pounds; high grade manure salts, basis 90 per cent. sulf of potash, $2.37½ per 100 pounds. These prices are for invoices of 50 tons, bases on foreign analyses and foreign invoice weights, ex-ship, New York.

Muriate of Potash.—Current arrivals continue to pass from first hands at syndicate prices.

Kainit.—The small lot of 30 or 40 tons in store, to which we have previously referred, has now been sold. Buyers will now have to supply their needs from second hands.

Brimstone is fairly steady at $18.75 for best unmixed seconds on spot, and thirds are quoted at $18.25.

Nitrate of Soda.—Prices continue low and the market quiet and weak. Spot lots are quoted at $1.82½ and futures at $1.77½. Mr. F. B. Nichols, in his circular dated the 1st inst., states that arrivals during the fortnight ending on that day amounted to 37,895 bags, against deliveries for the fortnight of 16,524 bags. The stock on the spot is thus increased from 59,334 bags on January 15th to 80,705 bags on February 1st. The total arrivals this year to date aggregate 97,229 bags, against 110,956 bags during the corresponding period in 1889. Total deliveries to February 1st were 43,196 bags, against 63,058 bags last year. The visible supply is estimated at 404,705 bags, against 270,232 bags at the same time in 1889. In reviewing the market for the last half of January, Mr. Nichols says:

"The market in the fortnight was dull but fairly firm, notwithstanding frequent arrivals. The shipments from the coast for January are announced at 70,000 tons for Europe and 3,000 tons for the United States. At last the producers have resolved and entered into a combination to reduce the output. London is stronger, with a hope that the consumption will absorb the large increased supply. Some business was done for late shipment, but our list to arrive takes in nothing later than April and May shipment."

Liverpool. Jan. 22.

(Special Report by Messrs. J. P. BRUNNER & Co.)

Chemicals.—There is no great activity to report in heavy chemicals at the moment, but with a limited supply the market is fairly steady all round.

Soda Ash.—Carbonated is wanted, but there are no sellers for prompt delivery, and scarce for February delivery at 1⅛d.@1¼d., according to brand. Caustic ash is also scarce, and 1¼d. nearest value, with business reported at this figure.

Soda crystals in small compass, and held for £2 17s. 6d.@£3 per ton.

Caustic soda is scarcely so firm, as several resellers have come out. At the same time it is difficult to get anything for prompt delivery, and makers are very firm in their ideas; 60 per cent. is held for £7@£7 5s., and it is difficult to find sellers 70 per cent. A few resales have been made at £7 17s. 6d., but £8 and upward asked by makers, and supply limited for prompt delivery; 74 per cent. is inquired for and little offering; £9 is asked, but we do not hear that this figure has been paid so far; 76 per cent. £9 5s.@£9 10s. Bleaching powder is meeting with rather more inquiry, and £5 12s. 6d.@£5 15s. are nearest values for prompt, or February delivery, with business reported at this range.

Chlorate of potash rather better at 4¾@5c., and makers generally have little to sell. Bicarb soda in demand at £5 5d. per ton and upward for one hundred weight kegs, according to brand and quantity, with usual allowances for larger packages. Sulphate of ammonia declined to £11 17d. 6s. per ton for good gray 24 per cent. f.o.b. Liverpool, and buyers are trying to get on at rather less money, but makers are not inclined to make any further concessions.

Manchester. Jan. 25.

(S. W. Royce & Co.'s Report.)

Chemicals.—The New Year opened very promisingly with a strong tone in the chemical markets. Some of the Lancashire alkali manufacturers have had difficulties in obtaining supplies of fuel and slack, and this, with buyers coming into the market at the opening of the year, caused a strong advance in prices of bleaching powder and caustic soda; buyers have, however, now become shy, and bleach has already given way a little, but caustic soda remains very firm, the production being so limited at present. Makers of soda ash have been very busy, and are heavily booked for some weeks ahead; bicarbonate of soda is in good demand, and higher prices are now asked for soda crystals. Chlorate of potash is also firmer, though not actually dearer. The cutting in prices of oxalic acid continues, although makers have been well supplied with orders for early delivery, buyers having delayed purchasing in order to take advantage of the lower prices announced for the commencement of the new year.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, Feb. 7.

There is very little news of importance in building material circles. There is a fair attendance at both the Building Material and the Mechanical and Traders' exchanges, but, as is usual at this season, business is made secondary to gossip and social intercourse.

Bricks.—Values have shown very little variation during the week under review. Bricks continue to come forward from most of the producing districts with more or less regularity and are disposed of slowly at ruling prices. There is a hand-to-mouth demand, but on account of the uncertainties of the weather, builders are disinclined to begin new enterprises of magnitude just yet. About $7 to $7.25 is the usual quotation for standard grades of Haverstraw brick.

Stone.—The tariff is still a topic of discussion among quarrymen and dealers. Last week we referred to the demand of a Massachusetts Congressman for an increased duty to protect the granite of his State. We have now to record that the marble association of New England, which met in Boston recently, has presented a memorial to Congress, asking that the duty on imported Italian marble be increased to 12 cents a square foot for slabs not exceeding one inch in thickness, and to 24 cents per square foot for slabs from 1⅛ to 2 inches in thickness, with a proportionate increase for the various intermediate thicknesses. The tariff under which marble is now imported is that of 1883, which placed the duty at 65 cents per cube in blocks, and $1 per cube for sawed marble.

The New England Association claims that this rating allows ¾ inch slabs to be imported at 5 cts. less than they can be produced in America from imported marble. This, of course, is unfair to American marble cutters.

Slate.—The latest rumor as to what is going on in the Pennsylvania slate districts is, that a great sale of slate properties in the Slatington region is being closed with a syndicate composed of New York and Philadelphia capitalists. It is stated that the properties number about twenty and include the best quarries in the district. The syndicate is also stated to be after important slate quarries in the Bangor and Pen Argyle regions in Northampton county, Mass. Hoadley, Lauterbach & Johnson of New York are said to be the attorfor the syndicate.

IMPORTS AND EXPORTS OF METALS AT NEW YORK JANUARY 25 TO FEBRUARY 5 AND FROM JANUARY 1.

IMPORTS.

Spelter.	Week. Tons.	Year. Tons.
Amer. Metal Co.		25
Meyer, G. A. & E.		9
Muller, Schall & Co.		69
Total		103
Corres. date, 1889		50

Pig Lead.	Lbs.	Lbs.
Schultz & Co., A.		98
Total		98
Corres. date, 1889		

Tin.	Tons.	Tons.
Amer. Metal Co.		100
Crooks & Co., R.		25
Naylor & Co.		150
Phelps, Dodge & Co.		50
Townsend, & Co., J. R.		30
Total		355
Corres. date, 1889		798

Tin Plates.	Boxes.	Boxes.
Bruce & Cook	968	7,591
Byrne & Son		1,000
Central Stamp. Co.	527	13,678
Coddington & Co.	1,248	10,623
Cohn & Co		459
Con. Fruit Jar Co.		120
Corbiere F. & Co.		380
Cort & Co.		14,277
Crooks & Co.		2,996
Dickerson, V. D. & Co.	3,082	25,873
Iron Clad Mfg. Co.		267
Lalance & G. M. Co.		1,138
Merchant & Co.	1,000	4,679
Mersick & Co.		891
Morewood & Co.		8,892
Pratt Mfg. Co.		3,134
Phelps, Dodge & Co	1,512	22,277
Shepard & Co.		789
Taylor, N. & G.		40
Thomson & Co., A. A.		4,971
Wheeler & Co.		1,346
Whittemore & Co.		1,488
Wolff & Reesing		625
Total	5,337	123,337
Corres. date, 1889		150,714

Pig Iron.	Tons.	Tons.
Crocker Bros.		200
Total		200
Corres. date, 1889		1,700

Steel Blooms, Billets, and Slabs.	Tons.	Tons.
Dana & Co		254
Pope, Jas. E., Jr.		61
Roebling's Sons, J. A.		55
Wolff, & Co., R. H.		60
Total		430
Corres. date, 1889		2,160

Bar Iron.	Tons.	Tons.
Abbott & Co., Jere.		169
Bacon & Co.		45
Crocker Bros.		77
Downing & Co.		135
Lillenberg, N.		100
Milne & Co.		34
Page, Newell & Co.		192
Wilson, J. G.		2
Total		754
Corres. date, 1889		1,320

Scrap Iron.	Tons.	Tons.
Samper & Co., S.		186
Total		186
Corres. date, 1889		354

Steel and Iron Rods.	Tons.	Tons.
Abbott & Co.		532
American S. Co.		50
Carey & Moen	18	18
Downing & Co.		25
Galpin, S. A.		249
Greely & Co., C. S.		30
Jacobus, E. Y.		2
Lundberg, G.		110
Milne & Co.		180
Muller, Schall & Co.	100	100
Naylor & Co.	36	286
Page, Newall & Co.	50	50
Roebling's Sons, J. A.		361
Wood & Niebuhr		25
Wolf & Co., R. H.		664
Total	54	2,682
Corres. date, 1889		4,576

Old Rails.	Tons.	Tons.
Frankfort, M.		654
Total		654
Corres. date, 1889		2,179

Spiegeleisen.	Tons.	Tons.
Blakely & McLellan		1,460
Crocker Bros.	712	1,955
Dana & Co.	50	1,196
Foley, F.		50
Hernshime, L.		1,690
Naylor & Co.		1,42[illegible]0
Perkins, C. L.		46[illegible]0
Total	762	8,011
Corres. date, 1889		5,724

Iron Ore.	Tons.	Tons.
Baiz, Jacob		67
Earnshaw, A.		742
Total		809
Corres. date, 1889		749

EXPORTS.

Copper.	Pounds.	Pounds.
Abbott & Co., Jere.	112,500	370,000
Amer. Met. Co., Lt.		478,894
Total	112,500	857,894
Corre. date, 1889		

Copper Matte.		
American Metal Co		224,081
Lewisohn Bros.		592,162
Nichols, Geo. H.	267,202	267,202
Paulsen, Wm.		978,100
Wil'ms & T'hune.		1,192,514
Total	267,202	3,254,360
Corres. date, 1889		

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and amount of last.			Dividends. Total paid.	Dividends. Date and amount of last.		
1	Adams & L.	Colo.	$1,500,000	150,000	$10	*	.....	.....	.....	$555 000	Jan.	1887	.15
2	Alice, s. &	Mont	10,000,000	400,000	25	*	.....	.....	.....	825,000	Dec.	1889	.06¼
3	Alma Cons., G.	Idah.	300,000	30,000	10	.....	.....	.....	.....	45,000	Dec.	1889	.50
4	Amy & Silversmith, s.	Mon.	.....	341,419	.....	.....	.....	.....	.....	247,530	Aug.	1887	12½
5	Atlantic, C	Mich	1,000,000	40,000	25	$280,000	Apl.	1878	$1.00	580,000	Feb.	1890	1.50
6	Argenta, s.	Nev..	10,000,000	100,000	100	335,000	July	1889	.10	40,000	Feb.	1890	.20
7	Aspen Mg. & S., s. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	360,000	July	1889	.20
8	Aurora, l.	Mich	2,000,000	100,000	20	.....	.....	.....	.....	155,000	Oct.	1887	1.87½
9	Badger, s.	Oct.	250,000	50,000	5	.....	.....	.....	.....	25,000	Jan.	1890	.25
10	Bassick, G. S.	Colo.	10,000,000	100,000	100	.....	.....	.....	.....	400,000	Mar.	1884	1.00
11	Belle Isle, s.	Nev..	10,000,000	100,000	100	155 000	Apl.	1889	.10	300,00..	Dec	....	.05
12	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,822,000	Feb	1889	.60	15,397,200	Apl.	1876	1.00
13	Bellevue Idaho, s. L.	Idah.	1,250,000	125,000	10	120,000	Dec.	1889	25	187,500	Jan.	1887	10
14	Bodie Con., G. &	Cal.	10,000 000	100 000	100	575,000	Nov	1889	25	1,295,000	Apl.	1885	50
15	Boston & Mont., G.	Mon.	2,500,000	250,000	10	*	.....	.....	.....	550,000	Jun.	1886	.10
16	Boston & Mont., C.&	Mon.	2,500,000	100,000	25	*	.....	.....	.....	1,400,000	Feb.	1890	1.00
17	Breece, s.	Colo	5,000,000	200,000	25	*	.....	.....	.....	2,000	Feb.	1880	.01
18	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	.....	.....	.....	.....	127,000	July	1887	.05
19	Bulwer, G.	Cal..	10,000,000	100,000	10	130,000	Aug.	1889	.25	175 000	Jan.	1884	.10
20	Bunker Hill & Sull..	Idah.	3,000,000	300,000	10	*	.....	.....	.....	150.000	Oct.	1883	.06⅔
21	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	136,000	Oct	1889	.08
22	Calliope, s.	Colo.	1,000,000	.....	.....	.....	.....	.....	.....	60,000	Jan.	1890	.01
23	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	1,200,000	.....	.....	.....	33,350,000	Feb.	1890	5.00
24	Carbonate Hill s. L.	Colo.	1,500,000	300,000	10	*	.....	.....	.....	80,000	Apl.	1884	.05
25	Carlisle, G.	N. M.	1,000,000	200,000	5	.....	.....	.....	.....	175,000	Dec.	1888	12½
26	Castle Creek, G.	Idah.	100,000	100,000	1	.....	.....	.....	.....	51,000	Oct..	1883	.03
27	Catalpa, s. L.	Colo.	3,000,000	300,000	10	*	.....	.....	.....	270,000	May.	1884	.10
28	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,980,000	Feb.	1890	1.00
29	Chrysolite, s. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	1,850,000	Dec.	1884	.25
30	Colorado Central, s. L.	Colo.	2,750,000	275,000	10	*	.....	.....	.....	406,000	July	1889	.05
31	Confidence, s. L.	Nev..	.....	24,980	.....	287,440	Apl.	1887	.50	199.880	Apl.	1889	1.00
32	Cons. Cal. & Va., G. &	Nev.	21 800 000	216.000	100	108,000	Jan.	1885	.20	3,358,800	Jan.	1890	.50
33	Contention, s.	Ariz.	12,500,000	250,000	50	.....	.....	.....	.....	$2,587,000	Dec.	1884	.25
34	**Cop. Queen Cons, C.	Ariz.	1,400 000	140,000	10	.....	.....	.....	.....	140,000	Oct.	1888	.50
35	Crescent, s. & G.	Utah	15,000,000	300,000	25	.....	.....	.....	.....	228,000	Oct.	1888	.03
36	Crown Point, G. &	Nev..	10 000 000	100,000	100	2,850,000	Sept	1880	.50	11,880,000	Jan.	1875	2.00
37	Daly, s. L.	Utah	3,000,000	150,000	20	*	.....	.....	.....	1,350,500	Jan.	1890	.25
38	Deer Creek, s. G.	Idah.	1 000,000	200,000	5	*	.....	.....	.....	20,000	Jun.	1889	.05
39	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25	*	.....	.....	.....	$1,000,000	Nov.	1887	.10
40	Derbec R. Grav., G. &	Cal..	10,000,000	100,000	100	90,000	Dec.	1881	.10	210.000	Oct.	1889	.10
41	Dunkin, s. L.	Colo.	5,000,000	200 000	25	*	.....	.....	.....	390,000	Sept	1889	.05
42	Dunstone, G. & L.	Mont	1,000,000	200,000	5	*	.....	.....	.....	6,000	Nov.	1888	.03
43	Eclipse.	Colo.	100,000	100,000	1	.....	.....	.....	.....	30,000	Nov.	1887	.10
44	Elkhorn, G. &	Mont	1,000,000	100,000	10	50,000	July	1883	.50	170,000	July	1887	.05
45	Empire Lt., G.	Mont	500,000	100,000	5	.....	.....	.....	.....	70.500	Oct.	1887	.37½
46	Eureka Con., G. & L.	Nev..	5,000,000	50,000	100	550,000	Jun.	1889	.50	4,965,000	July	1888	.25
47	Evening Star, s. L.	Colo.	500,000	50,000	10	*	.....	.....	.....	1,437,500	Dec.	1889	.25
48	Excelsior, G. &	Cal.	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1889	.25
49	Father de Smet, G.	Dak.	10,000,000	100 000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1885	.20
50	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871	.....	1,600,000 C	Jan.	1889	2.00
51	Freeland, G. & C.	Colo.	5,000,000	200,000	25	*	.....	.....	.....	190,000	July	1886	.10
52	Garfield Lt., G. &	Nov.	500,000	100,000	5	.....	.....	.....	.....	85,000	Apl.	1888	12½
53	Gould & Curry, G. &	Nev..	10,800,000	108,000	100	4,434,600	Oct.	1889	.30	3 826,800	Oct.	1870	10.00
54	Grand Prize, G.	Nev..	10,000,000	100,000	100	715,000	Nov.	1889	.30	495,000	Mar	1884	.25
55	Granite, s. L.	Idah.	500,000	50,000	10	*	.....	.....	.....	30.000	Oct.	1889	.02
56	Granite Mountain, s.	Mont	10,000,000	400,000	25	.....	.....	.....	.....	8 200,000	Feb.	1890	.50
57	Green Mountain, G.	Cal..	1,250,000	125,000	10	*	.....	.....	.....	212.000	Nov.	1881	.07½
58	Hale & Norcross, G. &	Nev..	11,200,000	112.000	100	5,086,000	July	1887	.50	1,162,000	July	1888	.50
59	Hecla Con., s. G. L. C.	Mont	1,500,000	30,000	50	.....	.....	.....	.....	1,437,500	Dec.	1889	.50
60	Hel'n Mg & Red, G. & L.	Mont	3,315,000	663,000	5	*	.....	.....	.....	197,973	July	1886	.06
61	Holmes, s.	Nev.	10,000,000	100,000	100	300,000	Sept	1885	.10	75,000	Apl.	1886	.25
62	Holyoke, s.	Idah.	200,000	200,000	1	*	.....	.....	.....	27.000	Feb.	1883	.10
63	Homestake, G.	Dak..	12,500,000	125,000	100	200,000	July	1878	1.00	4,493,750	Jan.	1890	.10
64	Honorine, s. L.	Utah	500,000	250,000	2	37,500	Apl.	1889	.05	125,000	Sept	1887	.05
65	Hope, s.	Mont	1,000,000	100,000	10	*	.....	.....	.....	233,252	Apl.	1888	.25
66	Horn-Silver, s. L.	Utah	10.000.000	400.000	25	*	.....	.....	.....	4,050,000	Dec.	1889	12½
67	Hubert, G.	Colo.	1,000,000	1 mil'n	1	*	.....	.....	.....	247.000	Dec.	1889	.00½
68	Idaho, G.	Idah.	210,000	21,000	100	.....	.....	.....	.....	5,250,500	Dec.	1889	5.00
69	Ideal, s. L.	Colo.	1,500,000	50,000	10	*	.....	.....	.....	15,000	Oct.	1886	.05
70	Illinois, s.	N. M.	100,000	100,000	1	.....	.....	.....	.....	45,000	Apl.	1889	.20
71	Independence, s.	Nev..	10,000,000	100,000	100	340.000	Oct.	1886	.20	225.000	Sept	1879	.25
72	Iron Hill, s.	Dak.	2,500,000	250,000	10	134,000	July	1889	.03	156,250	Nov	1887	.07½
73	Iron-Silver, s. L.	Colo.	10,000,000	500,000	20	*	.....	.....	.....	2,500.000	Apl.	1889	.20
74	Jackson, G.	Nev.	5,000,000	50,000	100	237,500	Nov	1880	.40	55,000	Jun.	1889	.10
75	Jay Gould	Mont	2,000,000	100,000	5	*	.....	.....	.....	365,000	Apl.	1889	.04
76	Joculistita, G.	Mex.	2,500,000	250,000	10	.....	.....	.....	.....	1,300,000	Feb.	1889	.50
77	Jumbo, G.	Colo.	2,000,000	200,000	10	.....	.....	.....	.....	35.000	Oct.	1887	.02½
78	Kearsarge, C.	Mich	1,250,000	50,000	25	190,000	Oct.	1887	1.00	100,000	Jan.	1890	2.00
79	Kentuck.	Nev.	3,000,000	30,000	100	369,000	Dec.	1889	.30	1,350,000	Dec.	1886	.10
80	La Plata, s. &	Colo.	2,000,000	200,000	10	*	.....	.....	.....	610,000	Sept	1882	.30
81	Leadville Cons., s. L.	Colo.	4,000,000	400,000	10	*	.....	.....	.....	423,000	Apl.	1887	.05
82	Lexington, G. &	Mont	4,000,000	40,000	100	*	.....	.....	.....	565,000	Jan.	1885	2.00
83	Little Chief, s. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	810,000	Jan.	1890	.05
84	Little Pittsburg, s. L.	Colo.	20,000,000	200,000	100	*	.....	.....	.....	$1,050,000	Mch	1890	.50
85	Martin White, s.	Nev..	10,000,000	100,000	100	1,175,000	Jan.	1889	.25	140.000	Dec.	1886	.25
86	Mary Murphy, G. &	Colo.	350,000	3,500	100	*	.....	.....	.....	175,000	May	1888	5.00
87	Moonshess, s.	Colo.	500,000	500,000	1	.....	.....	.....	.....	12,500	Dec.	1889	.01½
88	Minnesota, C.	Mich	1,000,000	40,000	25	420,000	Apl.	1886	1 00	1,820,000	Mar.	1886	.....
89	Mono, G.	Cal.	5,000,000	50,000	100	102,850	Nov.	1889	.25	12.500	Mar.	1886	.25
90	Montana, Lt., G. &	Mont	3,300,000	660,000	5	*	.....	.....	.....	2,415,951	Jan.	1890	.09
91	Morning Star, s. L.	Colo.	1,000,000	100,000	10	*	.....	.....	.....	795,000	Dec.	1889	.20
92	Moulton, s. G.	Mont	2,000,000	400,000	5	*	.....	.....	.....	380,000	Dec.	1887	.07½
93	Mount Pleasant, G.	Cal..	150,000	150,000	1	*	.....	.....	.....	150.000	Feb.	1887	.30
94	Mt. Diablo, s.	Nev..	5,000,000	50,000	100	137,500	Jun.	1880	2.00	150,000	Oct	1889	.20
95	Napa, Q.	Cal.	700,000	70,000	10	*	.....	.....	.....	350,000	Jan.	1890	.20
96	Navajo, G. &	Nev..	10,000,000	100,000	100	485,000	Apl.	1888	.30	365,000	Apl.	1889	.10
97	New Guston, s.	Colo.	500,000	100,000	5	*	.....	.....	.....	287,500	Dec	1889	.87½
98	N. Hoover Hill, G. &	N. C.	300,000	120,000	2½	*	.....	.....	.....	30,000	Dec.	1885	.06⅔
99	Northern Belle, s.	Nev..	5,000,000	50,000	100	425,000	Jan.	1884	8.30	2,400,000	Apl.	1883	.50
100	North Belle Isle, s.	Nev..	10,000,000	100,000	100	400,000	Sept	1889	.20	230,000	May	1888	.50
101	North Star, G.	Cal..	1,000,000	100,000	10	.....	.....	.....	.....	250.000	Dec.	1889	.50
102	Ontario, s. L.	Utah	15,000,000	150,000	100	.....	.....	.....	.....	10,700,000	Jan.	1890	.50
103	Ophir, G. &	Nev..	10,000,000	100,000	100	4,159,440	May	1889	.50	1,995,800	July	1882	1.00
104	Original, s. C.	Mont	1,500,000	60,000	25	*	.....	.....	.....	123.000	July	1888	.05
105	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,372,500	Mar.	1890	1 00
106	Oxford, G.	N. S.	125,000	125,000	1	.....	.....	.....	.....	73,500	Sept	1886	.02
107	Paddock Valley, G.	Nev.	10,000,000	57,000	100	57,000	Apl.	1888	.15	150,000	Apl.	1889	.40
108	Parrot, C.	Mont	1,800,000	180,000	10	.....	.....	.....	.....	480,000	Oct.	1889	.05
109	Peacock, s. G. C.	N. M.	2,000,000	200,000	10	.....	.....	.....	.....	60.000	Nov.	1886	.....
110	Plumas Eureka, G.	Cal..	1,400,250	140,625	10	*	.....	.....	.....	2,548,046	Oct.	1889	.37½
111	Plutus, G. & C. L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	20,000	Feb.	1886	.10
112	Plymouth Con., G.	Cal..	5,000,000	100,000	50	*	.....	.....	.....	2,280,000	Feb.	1888	40
113	Quicksilver, pref., G.	Cal..	4,300,000	43,000	100	.....	.....	.....	.....	1,792,962	Feb.	1890	1.50
114	Quicksilver, com., G.	Cal..	5,700,000	57,000	100	.....	.....	.....	.....	843,867	July	1882	.40
115	Quincy' C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862	.....	5,370,000	Jan.	1890	3.00
116	Republic, C.	Mich.	5,000,000	100,000	50	400,000	Dec.	1889	.30	4,312,587	Jun.	1887	1.25
117	Richmond, s. L.	Nev..	1,350,000	54,000	25	*	.....	.....	.....	99.785	Feb.	1880	.50
118	Ridge, C.	Mich.	500,000	20,000	25	219,939	Mar	1886	.50	585,000	Mar.	1886	.05
119	Robinson Con., s. L.	Colo.	10,000,000	200,000	50	*	.....	.....	.....	100,000	Dec.	1882	.50
120	Robert E. Lee, s. L.	Colo.	10,000,000	500,000	20	*	.....	.....	.....	4,460,000	July	1889	3.00
121	Savage, s.	Nev..	11,200,000	112,000	100	6,542,000	July	1889	.50	7,500	Apl.	1883	.01
122	Shosnone, G.	Idah.	150,000	150,000	1	.....	.....	.....	.....	1,598,146	Apl.	1888	12½
123	Sierra Buttes, G.	Cal..	2,225 000	122,500	10	*	.....	.....	.....	102,000	Jan.	1871	1.00
124	Sierra Nevada, G. &	Nev..	10,000,000	100,000	100	6,250,000	Oct.	1889	.50	40,000	May	1889	.02
125	Sierra Nevada, s. L.	Idaho	1,000,000	1	1	*	.....	.....	.....	270,000	Apl.	1889	.10
126	Silver Cord, G. & L.	Colo.	4,500,000	450,000	10	.....	.....	.....	.....	1,950,000	July	1887	.25
127	Silver King, G.	Ariz.	10,000,000	100,000	100	80,000	Jan.	1890	.30	50,000	June	1889	.05
128	Silver Mg. of L. V.	N. M.	500,000	500,000	1	*	.....	.....	.....	50.000	Nov.	1886	.02
129	Silverton, G. & L.	Colo.	2,000,000	200,000	10	*	.....	.....	.....	3,137,500	Jun.	1889	.10
130	Small Hopes Cons., s.	Colo.	5,000,000	250,000	20	*	.....	.....	.....	50.000	Jan	1881	25
131	Spring Valley, G.	Cal..	200,000	200,000	1	50,000	Oct.	1886	.25	3,595,000	Jun.	1888	.05
132	Standard, G. &	Cal..	10.000,000	100,000	100	25,000	Oct.	1884	.25	155,000	Nov	1881	.05
133	Stormont, s.	Utah	500,000	500,000	1	*	.....	.....	.....	844,000	Dec	1887	.20
134	St. Joseph, L.	Mo..	1,500,000	150,000	10	*	.....	.....	.....	9,000	Apl.	1886	.02½
135	Swansea, G.	Colo.	600,000	60,000	10	*	.....	.....	.....	1,200,000	Jan.	1890	8.00
136	Tamarack, C.	Mich.	1,000,000	40,000	25	520,000	Apl.	1885	5.00	100,000	Nov.	1881	.20
137	Tip Top, s.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	1,250,000	Apl.	1882	.10
138	Tombstone, G. & L.	Ariz.	12,500,000	500,000	25	*	.....	.....	.....	97,500	Feb.	1884	.20
139	United Verde, C.	Ariz.	3,000,000	300,000	10	*	.....	.....	.....	37,500	Apl.	1886	2.50
140	Valencia, s.	N. M.	150,000	1,500	100	*	.....	.....	.....	272,500	Oct.	1886	.37½
141	Viola Lt., s. L.	Idah.	750,000	150,000	5	*	.....	.....	.....	20,000	Dec.	1889	.05
142	Ward Cons., s. L.	Colo.	2,000,000	200,000	10	.....	.....	.....	.....	1,275,000	July	1887	.10
143	Yankee Girl	Colo.	2,500,000	250,000	10	*	.....	.....	.....	2,184,000	Aug	1871	1.50
144	Yellow Jacket, G. &	Nev..	12,000,000	120,000	100	6,500,000	Mar	1889	.50	3,300	Jun.	1889	.10
145	Webb City, L. Z.	Mo..	55,000	11,000	5	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND PAYING MINES

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par Value.	Assessments. Total levied.	Assessments. Date & am't of last,		
1	Agassiz Cons., s. L.	Colo.	$2,500,000	50,000	$50	*	.....	.....	.....
2	Alleghany, s.	Colo.	5,000,000	500,000	10	*	.....	.....	.....
3	Altoues, C.	Mich	2,000,000	80,000	25	$737,000	Jan.	1890	.50
4	Alpha Con., G. &	Nev..	3,000,000	30,000	100	5o3,750	Jan	1888	87½
5	Alta, s.	Nev..	10,080,000	100,800	100	2,248,800	Sept	1888	.60
6	Amador, G.	Cal..	400,000	200,000	2	*	.....	.....	.....
7	American Flag, s.	Colo.	1,250,000	125,000	10	300,000	Jun	1877	.10
8	Amity, s.	Colo.	250,000	250,000	1	*	.....	.....	.....
9	Anglo-Montana, Lt.	Mon.	600,000	120,000	5	*	.....	.....	.....
10	Astoria, G.	Cal..	200,000	100,000	2	*	.....	.....	.....
11	Barcelona, G.	Nev..	5,000,000	200,000	25	*	.....	.....	.....
12	Bechtel Con., G.	Cal..	10,000,000	100,000	100	173,500	Jan.	1883	.10
13	Belmont, s.	Nev..	5,000,000	50,000	100	735,000	Apl.	1886	.10
14	Best & Belcher, G. &	Nev..	10,080,000	100,800	100	2,180,590	Jan.	1890	.20
15	Big Pittsburg, s. L.	Colo.	20,000,000	200,000	100	*	.....	.....	.....
16	Bi-Metallic, s.	Mon.	5,000,000	200,000	25	*	.....	.....	.....
17	Black Oak, G.	Cal..	3,000,000	300,000	10	*	.....	.....	.....
18	Boston Con., G.	Cal..	10,000,000	100,000	100	170,000	Nov	1888	.35
19	Bremen, s.	N. M.	5,000,000	500,000	10	*	.....	.....	.....
20	Brownlow, s.	Colo.	250,000	250,000	1	*	.....	.....	.....
21	Brunswick, G.	Cal..	2.000 000	400,000	5	*	.....	.....	.....
22	Bullion, G. &	Nev..	10.000,000	100,000	100	4,007,000	Aug.	1888	.50
23	Calaveras, G.	Cal..	500,000	500,000	1	*	.....	.....	.....
24	Carisa, G.	Wy.	500,000	100,000	5	*	.....	.....	.....
25	Carupano, G. & L. C.	Ven.	200,000	100,000	2	*	.....	.....	.....
26	Cashier, G. &	Colo.	500,000	250,000	2	*	.....	.....	.....
27	Charles Dickens, G. &	Idah.	1,250,000	250,000	5	*	.....	.....	.....
28	Cherokee, G.	Cal..	1,500,000	150,000	10	*	.....	.....	.....
29	Cholla, s.	Nev..	11,200,000	112,000	100	1,484,000	July	1889	.50
30	Cleveland, s.	Dak.	1,000,000	500,000	2	*	.....	.....	.....
31	Colchis.	N. M.	500,000	50,000	10	*	.....	.....	.....
32	Commonwealth, s.	Nev.	10,000,000	100,000	100	170,000	Nov	1888	.50
33	Comstock, G. &	Nev..	10,000,000	100,000	100	30 000	Mar.	1887	.15
34	Con. Imperial, G. &	Nev..	5,000,000	50,000	100	1,802,500	Nov.	1889	.05
35	Con. Pacific, G.	Cal..	6,000 000	60,000	100	192,000	Oct.	1889	.10
36	Cons. Silver, s.	Colo..	2,500,000	250,000	10	*	.....	.....	.....
37	Crescent, s. L.	Colo.	3,000,000	300,000	10	*	.....	.....	.....
38	Crocker, s.	Ariz.	10,000,000	100,000	100	125,000	Jun.	1889	.10
39	Crowell, G.	N. C.	500,000	500,000	1	*	.....	.....	.....
40	Dahlonega, G.	Ga..	250,000	250,000	1	*	.....	.....	.....
41	Dandy, s.	Colo.	5,000,000	500,000	10	*	.....	.....	.....
42	Decatur, s.	Colo.	1,500,000	300,000	5	*	.....	.....	.....
43	Denver City, s. L.	Colo.	5,000,000	500,000	10	*	.....	.....	.....
44	Denver Gold, G. L.	Colo.	300,000	60,000	5	*	.....	.....	.....
45	Durango, G.	Colo.	500,000	500,000	1	*	.....	.....	.....
46	Eastern Dev. Co., Lt.	N. S.	1,500,000	150,000	10	990,000	Mar.	1886	1.00
47	El Cristo, G. &	U.S.C	1,000,000	500,000	2	*	.....	.....	.....
48	El Dorado, G.	Cal..	1,000,000	250,000	4	*	.....	.....	.....
49	El Talento, G.	U.S.C	1,000,000	500,000	2	*	.....	.....	.....
50	Empire, s.	Utah	10,000,000	100,000	100	*	.....	.....	.....
51	Eureka Tunnel, s. L.	Nev..	10,000,000	100,000	100	*	.....	.....	.....
52	Exchequer.	Nev.	10,000,000	100,000	100	515.000	Apl.	1889	.25
53	Found Treasure, G. &	Nev..	10,000,000	100,000	100	30,500	Apl.	1889	12½
54	Gogebic L. Syn., I.	Wis.	5,600,000	200,000	25	*	.....	.....	.....
55	Gold Cup, s.	Colo.	500,000	500,000	1	*	.....	.....	.....
56	Golden Era, G.	Mon.	2 000,000	200,000	10	*	.....	.....	.....
57	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec.	1885	.25
58	Gold Rock, G.	Cal.	1,000,000	500,000	2	*	.....	.....	.....
59	Goodshaw, G.	Cal..	10,000,000	100,000	100	*	.....	.....	.....
60	Grand Belt, C.	Tex.	12,000,000	120,000	100	*	.....	.....	.....
61	Grand Duke.	Colo.	800,000	80,000	10	*	.....	.....	.....
62	Great Romance, G.	U.S.C	1,000,000	500,000	2	*	.....	.....	.....
63	Gregory-Bobtail, G.	Colo.	550,000	550,000	1	*	.....	.....	.....
64	Gregory Con., G.	Mon.	3,000,000	300,000	10	*	.....	.....	.....
65	Harlem M. & M. Co, G.	Cal..	1 000,000	200,000	5	*	.....	.....	.....
66	Head Cent. & Tr. s. G	Ariz.	10,000,000	100,000	100	*	.....	.....	.....
67	Hector, G.	Cal..	1,500,000	300,000	5	45,000	Jan.	1889	.15
68	Hecla Con., G.	Mich	500,000	25,000	20	*	.....	.....	.....
69	Hollywood, C.	Cal..	200,000	100,000	2	*	.....	.....	.....
70	Hortense, s.	Colo.	2,000,000	200,000	10	*	.....	.....	.....
71	Huron, C.	Mich	1,000,000	40,000	25	280,000	May	1887	3.00
72	Iron Gold & Silver, s.	N. M.	2,000,000	200,000	10	*	.....	.....	.....
73	Ironton, L.	Wis.	1,000,000	40,000	25	*	.....	.....	.....
74	Iroquois, C.	Mich	1,250,000	50,000	25	*	.....	.....	.....
75	J. Leymert, G.	Ariz.	10,000,000	100,000	100	*	.....	.....	.....
76	Julia Cons., G. &	Nev..	11,000,000	110,000	100	1,660,000	Jan.	1889	.10
77	Lacrosse, G.	Colo.	1,000,000	100,000	10	*	.....	.....	.....
78	Lee Basin, s. L.	Colo.	5,000,000	500,000	10	*	.....	.....	.....
79	Mayflower Gravel, G.	Cal..	1,000,000	100,000	10	535,000	Jan	1890	....
80	May Mazeppa, s.	Colo.	500,000	500,000	1	*	.....	.....	.....
81	Modoc, s.	Dak.	250,000	250,000	1	*	.....	.....	.....
82	Mexican, G. &	Nev..	10,000,000	100,000	100	2,800,760	Dec.	1889	.25
83	Middle Bar G.	Cal..	400,000	200,000	2	*	.....	.....	.....
84	Mike & Starr, s. L.	Colo.	1,000,000	200,000	5	*	.....	.....	.....

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES

NAME AND LOCATION OF COMPANY.	Feb. 1. H.	Feb. 1. L.	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb 5. H.	Feb 5. L.	Feb. 6 H.	Feb. 6 L.	Feb. 7. H.	Feb. 7. L.	SALES.
Adams, Colo	....	.....	.30	....	.30	....	....	.....	.50	....	.70	....	1,800
Alice, Mont	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Aspen, Colo	....	..	7.50	....	8.00	....	8.00	....	....	....	....	....	500
Basic, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Belcher	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Belle Isle, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Bodie Cons., Cal	....	.....	42	....	.50	....	....	....	....	....	....	....	400
Bes. & Mont., Mont	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Breece, Colo	.36	.....	....	....	....	....	....	....	.40	....	40	....	1,000
Bulwer, Cal	.25	.....	.25	....	.25	....	....	....	....	....	....	....	550
Caledonia, Dak	....	.....	....	....	1 40	....	1.50	.....	....	....	....	....	300
Calumet & Hecla	....	.....	....	....	....	....	....	....	....	....	....	....	..
Colorado Central	....	.....	....	....	....	....	....	....	....	....	.75	....	500
Cons. Cal. & Va., Nev.	5 00	4.95	4.95	....	....	....	....	....	4.85	4 70	....	....	450
Crown Point, Nev	1.65	.....	..	..	....	....	....	....	1.70	....	....	....	200
Deadwood, Dak	1.50	.....	....	....	....	....	....	....	....	....	....	....	300
Dunkin, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Eureka Con	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Father de Smet, Dak	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Franklin, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Freeland, Colo	.64	.60	....	....	....	....	....	....	....	....	.61	.66	6,500
Gould & Curry, Nev	....	.....	..	..	....	....	....	....	....	....	....	....	.....
Hale & Norcross, Nev	2.90	.....	....	....	....	....	....	....	....	....	....	....	100
Holyoke, Id	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Homestake, Dak	....	.....	9.00	....	....	....	....	....	....	....	8.00	....	70
Horn-Silver, Ut	2 45	.....	..	..	2.45	....	....	....	....	....	....	....	200
Iron Hill, Dak	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Iron Silver, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Leadville C., Colo	....	.....	.14	..	....	....	.12	....	.12	....	....	....	600
Little Chief, Colo	....	.....	.26	....	....	....	.27	.26	....	....	....	....	600
Little Pittsburg, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Mono, Cal	.45	.....	....	....	....	....	....	....	....	....	....	....	300
Mt. Diablo, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Navajo, Nev	..	.....	.35	..	..	....	.37	....	....	....	....	....	300
North Belle Isle, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
North Star, Cal	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Ontario, Ut	....	.....	....	....	40 25	....	40 25	.....	39.25	....	39.75	....	271
Opnir, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Osceola, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Plutus, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Plymouth, Cal	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Quicksilver, Pref	36.00	35.50	36.50	....	....	....	....	....	....	....	39 75	....	300
Com	....	.....	....	....	....	....	6.50	..	....	....	6.50	6.25	300
Robinson Cons. Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Savage, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Sierra Nevada, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Silver Cord	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Silver King	....	.....	.18	....	.16	.15	.20	.17	.22	.20	.20	....	60
Silver Mg. of L V	....	.....	.35	....	....	....	....	....	....	....	....	....	3,000
Small Hopes, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Standard, Cal	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Stormont, Utah	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Yellow Jacket	....	.....	....	....	....	....	....	....	2.10	....	....	....	00

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Feb. 1. H.	Feb. 1. L.	Feb. 3. H.	Feb. 3. L.	Feb 4. H.	Feb 4. L.	Feb 5 H.	Feb 5 L.	Feb 6. H.	Feb 6. L.	Feb 7. H.	Feb 7. L.	SALES
Alpha	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Alta, Nev	1.35	....	....	....	....	....	....	....	....	....	....	....	200
Andes, Nev	....	....	.65	.....	.30	....	....	....	....	....	....	....	1,100
Amador, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
American Flag, Colo	.04	....	....	....	....	....	....	....	....	....	....	....	.....
Astoria, Cal	.07	....	.08	....	....	....	....	....	....	....	.04	....	900
Barcelona, Nev	....	....	....	....	.31	....	....	....	.08	....	.04	....	17,700
Bechtel, Cal	....	....	....	....	....	....	....	....	.35	.31	....	.31	1,270
Best & Belcher, Nev	2 50	....	....	....	....	....	....	....	....	....	....	....	.....
Brunswick, Cal	....	....	....	....	....	....	....	....	....	....	....	....	100
Bullion, Nev	.70	.....	.70	....	....	....	....	....	.70	....	.65	....	900
Cashier, Colo	....	....	....	....	....	....	....	....	.01	....	....	....	1,000
Castle Creek, Id	....	....	....	....	....	....	....	....	....	....	....	....	.....
Chollar, Nev	....	.....	2.75	....	....	....	....	....	....	....	2 75	....	270
Col. & Beaver, Id	....	....	....	....	....	....	....	....	....	....	....	....	..
Commonwealth, Nev	....	....	....	....	....	....	....	....	....	....	....	....	..
Comstock T., Nev	....	....	....	....	.19	....	.19	.....	.18	....	....	....	300
" bonds	....	....	....	....	3 00	....	....	....	....	....	....	....	3,600
" scrip	....	....	....	....	92.00	....	....	....	....	....	....	....	3,000
Denver City, Colo	....	....	.10	....	.10	....	.10	....	....	....	....	....	3,000
El Cristo, Rep of Col	1.75	1.68	1 70	....	1.70	1.60	1.65	1.55	1 60	....	1.65	1.50	3,600
Excelsior, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Exchequer Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Gold Stripe, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Julia, Nev	.35	....	....	....	....	....	....	....	....	....	.35	....	700
Kingst'n & Pemb'ke	....	....	....	....	.70	.50	....	....	....	....	....	....	200
Kossuth, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Lacrosse, Colo	....	....	.07	....	....	....	....	....	....	....	.08	....	2,000
Lee Basin, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mexican, Nev	2.90	....	....	....	....	....	....	....	....	....	....	....	100
Middle Bar, Cal	....	....	....	....	....	....	....	....	.50	....	.60	..	2,000
Monitor, Colo	....	....	....	....	....	....	....	....	....	....	.55	....	.....
Mutual Sm. & M. Co	1.65	....	1 65	....	....	....	....	....	1.60	....	1.65	....	1,000
Nevada Queen, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
N. Com'nw'th, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Occidental, Nev	.80	....	....	....	....	....	....	....	....	....	....	....	300
Oriental & Mil., Nev	.07	....	....	....	....	....	....	....	....	....	....	....	3,000
Overman, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Phœnix of Ariz	.80	....	.87	.80	.84	.78	.76	.65	.70	.65	.73	.68	2,600
Potosi, Nev	1.90	....	....	....	....	....	....	....	1.90	....	....	....	200
Rappahann'k, Va	.06	....	.06	....	....	....	....	....	....	....	.05	....	2,250
S. Sebastian, San S	....	....	....	....	....	....	....	....	....	....	....	....	600
Scorpion, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Shoshone Idaho	....	....	....	....	....	....	....	....	....	....	....	....	.....
Silver Hill, Nev	....	....	.44	....	....	....	....	....	....	....	....	....	100
Silver Queen	....	....	....	....	....	....	....	....	....	....	.06	....	400
Stanislaus, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Sutro Tunnel, Nev	....	....	....	....	.06	....	....	....	....	....	....	....	100
" Trust Cert.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Sutter Creek, Cal	2.10	....	2.2	2.10	2.25	2.15	2.15	1.75	1.75	1 55	1 75	1.50	9,800
Union Con., Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
United Copper	....	....	....	....	....	....	....	....	....	....	....	....	.....
Utah, Nev	.70	....	.70	....	....	....	....	....	....	.65	....	.70	900

*Ex. dividend. †Dealt in at the New York Stock Ex. Unlisted securities ‡Assessment unpaid. Dividend shares sold, 20,241. Non-dividend shares sold, 76,360. Total, New York, 96,601

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	Jan. 31.		Feb. 1.		Feb. 3.		Feb. 4		Feb. 5.		Feb 6.		SALES.
Atlantic, Mich	14 50	14 25	....	....	....	....	14.00	....	14.00	....	....	....	460
Bodie, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bonanza Developm't	.90	....	.90	....	.90	....	.88	....	.88	....	....	....	1,350
Bost. & Mont., Mont	48.50	47.25	48 00	....	47.50	47.25	47 25	47.00	47 25	46.25	46 88	46.00	2,204
Breece, Colo	....	..	.35	....	....	....	....	....	....	....	....	....	200
Calumet & Hecla, Mich	....	.....	260	259	....	....	255	....	....	....	255	....	21
Catalpa, Colo	....	.....	....	....	.15	....	....	....	.15	....	....	....	800
Central, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Chrysolite, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Con. Cal. & Va., Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Dunkin, Colo	.70	55	.65	..	.68	....	.68	....	.68	....	....	....	800
Enterprise	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Franklin, Mich	14 75	.....	....	....	14 63	13.50	14.00	13.75	14.25	13.75	14.13	14 00	865
Hale & Norcross, Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Honorine, Utah	....	.....	....	....	....	....	....	....	.15	....	....	....	100
Little Chief	....	.....	....	....	.27	....	....	....	.27	....	....	....	700
Little Pittsburg, Colo	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Martin White, Nev	....	..	....	....	....	....	....	....	....	....	....	....	.....
Moulton	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Napa, Cal	4.50	.....	....	....	....	....	....	....	4.50	....	....	....	45
Ontario, Utah	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Osceola, Mich	29.75	28.50	28.75	28.50	29 00	28.50	28 50	27.88	27.50	26 25	28 25	26.00	3,073
Pewabic, Mich	....	.....	....	....	9 75	....	8.50	....	....	....	8.50	....	305
Quincy, Mich	71.00	....	70.50	....	71 00	....	70.50	..	71.00	70 50	....	....	57
Ridge, Mich	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Sierra Nev., Nev	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Silver King, Ariz	.27	.....	....	....	....	....	....	....	....	....	....	....	100
Standard, Cal	....	.....	....	....	....	....	....	....	....	....	....	....	.....
Tamarack, Mich	157	.....	158	156	157	....	160	153	161	160	160	159¾	257

NAME OF COMPANY.	Jan. 31.		Feb. 1.		Feb. 3.		Feb. 4		Feb. 5.		Feb. 6.		SALES
Alloues, Mich	2 00	....	2 50	2 00	2.00	.....	2.00	1.95	2.00	1.95	1.95	....	870
Arnold, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Aztec, Mich	....	....	....	....	....	....	.08	....	....	....	....	....	100
Bowman	....	....	....	....	....	....	....	....	....	....	....	....	.....
Butte & Bost., Mont	13.50	....	13.50	....	13.50	13.00	13.00	12.13	12.50	.....	13 63	12.50	1,358
Canada	....	....	....	....	....	....	....	....	....	....	....	....	.....
Centennial, Mich	....	....	....	....	....	....	....	....	....	....	28.00	....	19
Crescent, Colo	....	....	....	....	.08	....	.08	....	....	....	....	....	1,500
Dana	....	....	....	....	....	....	....	....	.08	....	....	....	.....
Don Enrique, N M	.32	....	....	....	33	....	....	....	....	....	....	....	.....
El Cr.sty, S. A	....	....	....	....	....	....	....	....	....	....	....	....	150
Hanover, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Humboldt, Mich	....	....	....	....	.15	....	....	....	....	....	....	....	.....
Hungarian	.30	....	....	....	....	....	....	....	....	....	....	....	200
Huron, Mich	4 25	....	....	....	....	....	....	....	....	....	....	....	100
Kearsarge	9 63	9.00	9 63	.....	10 00	9.38	10.38	10.00	10.75	10.00	10.00	10.00	100
Mesnard, Mich	....	....	....	....	....	.75	....	....	....	....	....	....	8,523
National, Mich	....	....	....	....	....	....	....	....	....	....	....	....	100
Orien & M ller, Nev	.08	....	....	....	....	....	....	....	....	....	....	....	.....
Phœnix, Ariz	.83	.....	....	....	.87	....	.85	....	....	....	....	....	500
Pontiac, Mich	.....	....	....	....	.23	....	.23	....	.23	....	....	....	600
Rappahannock, Va	....	....	....	....	....	....	....	....	....	....	....	....	300
Rockland	....	....	....	....	....	....	....	....	....	....	....	....	.....
Santa Fe, N. Mex	1 38	1 35	1.40	..	1.35	.....	1 40	1.25	1.35	1.28	1.30	1.28	5,340
Security, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Shoshone, Idaho	....	....	....	....	....	....	.20	....	....	....	....	....	.....
South Side, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Star	....	....	....	....	....	....	....	....	....	....	....	....	100
Washington, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....

Boston: Dividend shares sold, 11,887. Non-dividend shares sold, 15,230. Total Boston, 26,617.

COAL STOCKS.

NAME OF COMPANY.	Par v. l. of sh'rs.	Feb. 1. H.	Feb. 1. L.	Feb. 3. H.	Feb. 3. L.	Feb. 4. H.	Feb. 4. L.	Feb. 5 H.	Feb. 5 L.	Feb. 6 H.	Feb. 6 L.	Feb. 7 H.	Feb. 7 L.	Sales.
American Coal	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Cambria Iron	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Cameron Coal & Iron Co	....	....	.....	....	.....	....	.....	....	.....	....	.....	3½	.....	100
Ches. & O. RR	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Chic. & Ind. Coal RR	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Do. pref	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Col. & Hocking Coal	100	....	.....	....	.....	....	.....	....	.....	18¼	17¾	18¾	....	300
Col., C. & I	100	49⅜	48⅛	48⅝	48	48	46¾	48	47⅛	49	47¼	51¼	49	34,965
Consolidation Coal	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Del. & R. C	100	152	151⅛	151¼	151	151	150	151¼	....	151⅛	150½	....	....	3,301
D., L. & W. RR	50	137	136¼	137¼	136¼	137¼	136⅝	137	136⅝	136⅜	135¾	137¼	136⅛	117,547
Hocking Valley	100	....	.....	22	.....	21½	.....	21⅜	21¾	21⅝	.....	22	.....	525
Hunt. & Broad Top	....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Do. pref	.....	....	.....	44¾	.....	44¾	.....	....	.....	....	.....	....	.....	169
Illinois Coal & Coke Co	....	28½	28¼	28½	28¼	28¼	27¼	....	.....	27¼	.....	....	.....	1,210
Lehigh C. & N	50	52⅜	....	....	....	52¼	....	52¼	....	52⅛	....	....	....	318
Lehigh Valley RR	50	53⅜	53¼	53⅛	52¼	53⅛	53	53¼	53⅛	53⅛	53	....	....	720
Marshall Con. Coal	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Mahoning Coal	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Do. pref	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Maryland Coal	100	....	.....	....	.....	....	.....	14	13¼	15	.....	16	.....	1,400
Morris & Essex	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
New Central Coal	50	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
N. J. C. RR	100	120¼	119⅛	120	119⅛	119	115⅛	117⅛	115	118¾	117⅛	120	119	3,924
N. Y. & S. Coal	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
N. Y., Susq. & Western	100	....	.....	7½	.....	....	.....	7½	.....	....	.....	7½	.....	623
Do. pref	100	31¼	31	31	.....	30½	.....	....	.....	....	.....	31	.....	515
N. Y. & Perry C. & I	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Norfolk & Western R.R.	50	....	.....	....	.....	22½	.....	21¾	.....	....	.....	....	.....	300
Do. pref	50	62¾	.....	62⅞	62½	62½	62¼	62⅝	.....	....	.....	....	.....	710
Penn. Coal	50	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Penn. RR	50	55⅛	.....	55¼	55¼	55¼	55	55⅛	55	55⅛	54⅞	....	....	2,462
*Ph. & R. RR	.....	39⅞	39¼	40⅛	39⅛	40¾	39⅞	41	40	41½	40	43¼	41¼	352,898
Sunday Creek Coal	....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Do. pref	100	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Tennessee C. & I. Co	.....	86	85⅝	85⅛	84	85	80⅛	83¾	83	84⅛	83⅛	85⅝	84⅞	12,489
Do. pref	....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....
Westmoreland Coal	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	.....

**Sales in New York, 279,275; in Philadelphia, 73,623. Total sales 534,476.

San Francisco Mining Stock Quotations.

COMPANY	CLOSING QUOTATIONS. Jan. 31.	Feb. 1.	Feb. 3.	Feb. 4.	Feb. 5.	Feb. 6.
Alpha	.....	.....	1.45	1.25	.....	1.25
Alta	.....	.....	.....	.....	.....	.....
Belcher	.....	.....	.....	.25	.....	.....
Belle Isle	.20	.....	.....	.....	.....	.....
Best & Bel	2.40	2.50	2.45	2.50	2.35	2.70
Bodie	.....	.....	.45	.50	.....	.....
Bulwer	.....	.....	.....	.....	.....	.....
Chollar	2.70	2 70	2.80	2.65	2.65	2.65
C'm'weal'h	3.45	3.45	3 40	3.30	3.50	3.40
Con. C. & V	4.80	.....	4.70	4.70	4.60	4 65
Con. Pac	.....	.....	.....	.....	.....	.....
Crown Pt	1.55	1.50	1.55	1.55	1.65	1.55
Eureka C	.....	.....	.....	4.00	4.00	.....
Gould & C	.....	1.45	.....	.....	.....	1 40
Grd. Prize	.....	.....	.....	.....	.....	.....
Hale & N	3.00	2.90	.....	2.80	.....	3.00
M. White	.....	.....	.....	.....	.....	.....
Mexican	2.75	2.75	2.70	2.65	2.65	2.70
Mono	.....	.....	.....	.....	.....	.....
Mt. Diablo	.....	.....	.....	.....	.....	.....
Navajo	.35	.....	.....	.....	.....	.....
Nev. Queen	.....	.....	.....	.....	.70	.60
N. Belle I	.85	.....	.90	.85	.....	.....
Occidental	.....	.....	.....	.....	.....	.....
Ophir	3.70	3.70	3.65	3.60	3.60	3.70
Potosi	1 90	1.95	1.90	.....	1.85	1.95
Savage	1.60	1.65	.....	1.60	1.60	1.65
Sierra Nev	1.90	1.90	.....	1.90	1.95	.....
Union Con.	2.40	.....	2.30	2.25	2.25	2.30
Utah	.60	.....	.....	.....	.....	.55
Yellow Jkt	2.00	.....	2.05	.....	2.00	2.05

STOCK MARKET QUOTATIONS.

Baltimore, Md.

COMPANY.	Bid.	Asked.
Atlantic Coal	....	....
Balt. & N. C.	.10	.15
Big Vein Coal	....	....
Conrad Hill	.05	.10
Cons. Coal	.23½	.24½
Diamond Tunnel	.30	.40
George's Crk. C	....	1.10
Lake Chrome	.10	.35
North State (Balt.)	....	.22
Ore Knob	.10	.15
Silver Valley	.75	.90

Prices bid and asked during the week ending, Feb. 8th, 1890.

Birmingham, Ala.

COMPANY.	Bid.	Asked.
Ala. R. Mill Co.	$100	$60
*Alice Furnace,	$104½	....
Anna Howe n. Mg. Co.	$⅝	....
Bir. Mg.& M g.	$80	....
Cahaba Coal Mg Co	$55	$65
Camille Gold Mg Co	$⅛	$1
De Bardeleben C. & I. Co.	$70	$80
Decat. L. Imp.	$10⅛	$10½
DecaturMin.L.	$21	$23
*Eureka	$125@$126	$148@$150
Florence L. & Mg. Co.	$21	$24
Hecla Coal Co.	$10	....
Hen. S. & M.Co	$80	....
Mag-Ellen..	299	....
Mary Lee C. & R. Co.	$36	$45
Sheffield C & I. Co	$57	$80
Sloss I. & S.	....	$86
†Sloss I. & S.	$97⅜@$97½	$97⅜@$98
††Sloss I. & S.	$75¼	$80
Tuscaloose C. L. & L. Co	$21	....
Tenn.C. & I. Co.	$87	$88
" pref.	$114	$120
Woodstock I.Co.	$57½	$6¼

Prices bid and asked during week ending Feb. 8th, 1890.

* Bonds. † First mortgage. †† Second mortgage.

Denver, Colo.

COMPANY.	H.	L.	Sales.
Allegheny, Colo	.40	.30	12,100
Amity "	.30	.29	1,600
Aspen United"	.24	.22	21 000
Bangkok "	.11	.30	12,100
Big Indian "	.53	.39	15,100
Big Six "	.30	.20	94,500
Brownlow "	.52	.40	51,600
Calliope "	.51	.47½	3,600
Claudia, J., "	.20	.13	18,800
Clay County "	.50	.35	54,500
Hard Money "	.18	.10	131,500
Legal Tender "	.13	....	58,400
Matchless "	1.30	1.00	....
May-Mazeppa"	1.11	.96	45,400
Mollie Gibson"	.65	.45	1,400
Morning Glin"	.42	.38	15,100
Pay Rock "	.12½	.10	230,400
Puzzler "	.34	.23	46,200
Silver Cord "	.77½	.70	500
Whale "	.52	.38	22,200
Total	....	....	821,000

Prices during the week ending Jan. 29th, 890.

Kansas City, Mo. Feb. 4.

COMPANY.	Par value.	Bid.	Asked.
Ben Harrison	....	$25.00	$35.00
Burch, L. & Z., Mo.	1	.20	.30
Express Group	....	.75	1 00
Hillsboro Gold	....	....	....
Farmers' Coal Co	....	50.00	75.00
Ida Hill, S., N. Mex	100	....	100
Kansas City L. & Z.	....	.60	....
Kan. City M. & M. Co.	....	2.60	3.00
K. C , Colo	....	....	....
Kentuck, Z., Mo	1	....	....
La Motte, Mo	100	....	100.00
Leona	....	....	125
Maverick, S., Colo.	10	....	1.00
Minnequa Zinc	....	.25	.45
Quartz Mt.	....	.67	....
Ruby Silver	....	1.12	1.25
Sonora, G. & S., Mex.	10	....	1.00
Standard, S. S., Colo.	....	....	....
Silver Monument	....	....	3.00
Templar, N. Mex.	1	....	1.00
The Sylph	....	....	2.50
Webb City, L. Z., Mo.	5	5.65	....
Wichita, L. Z., Kan.	100	....	.40

Pittsburg, Pa.

COMPANY.	H.	L.	Closing
Allegheny Gas Co.	$39.75	....	$39.75
Bridgewater Gas Co.	40.00	29.00	40.00
Chartiers Val. Gas	*39.00	*39.00	*39.00
Columbia Oil Co.	2.75	....	2.75
Consolidated Gas Co.	38.00	....	38.00
Forest Oil	....	....	....
Hazlewood Oil Co.	....	....	....
La Noria Mining	*.20	*.13	*.20
Luster Mg. Co.	*24.50	*24.50	24.50
Manufacturers Gas Co.	....	....	....
Nat. Gas Co. of W. Va	....	....	....
N.Y.& Clev.Gas Coal.	37.00	35.75	37.00
Ohio Valley Gas	....	....	....
Pennsylvania Gas	15.00	14.00	15.00
People's N. G. & P. Co.	*14.13	*14.13	*14.13
Philadelphia Co.	31.75	31.63	31.63
Pine Run Gas Co	82.50	82.00	82.50
Pittsburg Gas	80.00	65.00	80.00
Silverton Mg. Co.	1.13	1.13	1.13
South Side Gas.	....	....	....
Texas Oil Co.	70.00	69.00	70.00
Union Gas	....	....	....
Washington Oil Co.	*80.00	*80.00	*80.00
W'house Brake Co.	62.75	....	62.75
W'house A. B. Co.	110.00	110.00	110.00
W'house E.Light	48.38	48.00	48.38
Wheeling Gas	20.00	....	18.50
Yankee Girl Mg.	3.75	3.50	3.50

* Actual selling price.

Sales during the week ending Feb. 6, 1890:

Chartiers Val. Gas, 19 shs.		@$39.00
La Noria Mg. Co. 250 "		.19@.20
Peoples'N.G.&P.Co 50 "		@$14.13
Philadelphia Co. 305 "		$31.63@$31.74
West. Elec. Co. 207 "		$48.00@$48.38

Sales at the New York Stock Exchange week ending Jan. 31:

	Sales.	Price H.	Price L.
*American Cotton Oil	10,695	28¾	26⅞
National Lead	140,280	21⅝	18½
Sugar	101,181	64	56½

*Trust receipts.

St. Louis. Feb. 4.

CLOSING PRICES.

COMPANY.	Bid.	Asked.
Adams, Colo	$ .37½	$ .40
American & Nettie	1.35	1.90
Anderson	....	....
Arizona	....	....
Aztec, N. Mex	.12	.16¼
Black Oak, Cal	....	....
Black Spar	....	....
Bremen	....	....
Buckskin	.05	.06¼
Carriboo, Idaho	....	....
Central Silver	.17½	.18¾
Cleveland, Colo	....	....
Cleveland, Idaho	.28¾	.35
Cœur d'Alene	.75	.95
Dinero, Colo	....	....
Golden Era, Mont	.01½	.02½
Golden King	.15	.16¼
Gold Run	.01⅛	.02
Granite Mountain, Mont.	....	....
Hope, Mont	....	....
Ingram	.50	....
Iron Clad	....	....
Ivanhoe, Colo	.14½	.20
I. X. L., Colo	.05	.05½
Jumbo, Colo	....	....
Keystone	.02½	.03½
La Union	.22½	.23¾
Little Giant	....	....
Major Budd, Mont	.18¾	.20
Mexican Imp., Mex	.16¼	.18¾
Michael Breen	.88¾	.91¼
Montrose Placer, Colo.	.38¾	.42½
Mountain Key	.55	.60
Mountain Lion	.05	.06
Neath, Colo	.04	.05
Old Colony	....	....
Old Jesuit	....	....
Pat Murphy, Colo	.05½	.07
Pedro	.00½	.01½
Phillips, Colo	.10	.10½
Pine Grove, Idaho	.01	.01½
Queen of the West, Idaho	.03	.10
Raspberry, Mont	.03	.06
Rosalis	....	....
San Francisco, Mont	.01½	.02
San Pedro	....	....
Silver Age, Colo	1.40	1.60
Silver Bell	....	....
Small Hopes, Colo	.75	....
Tourtelotte, Colo	.09½	.10½
West Granite, Mont	.77½	.80
Wire Patch	.10	....
Yuma, Ariz	.40	.45

Trust Stocks. Feb. 7.

The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

CERTIFICATES.

American Cotton Oil, old	$33	@$35
*American Cotton Oil new	27	@ 27¼
Cattle Trust	10	@ 14
Distillers' & Cattle Feeders'.	39½	@ 40
Linseed Oil	44½	@ 46
National Lead	19	@ 19½
Natural Gas	125	@130
Standard Oil	164½	@166
Sugar Refineries	59⅝	@ 59¾

*These are the American Cotton Oil Central Trust Co.'s receipts and are known as new, and represent the old certificates which have been deposited in the Central Trust Co. in furtherance of the reorganization plan—from a trust to a corporation

Foreign Quotations.

London.

COMPANY.	Highest.	Jan. 25, Lowest.
Almada, Mex.	1s 6d.	1s.
Amador, Cal.	£ ½	£⅜
Appalachian, N. C.	1s 3d.	1s.
Canadian Phos. Canada.	£¾	£½
Carlisle, N. Mex	3s 6d	3s.
Colorado, Colo.	4s.	3s.
Comstock, Utah	....	....
Condova	....	....
Cons. Esmeralda, Nev.	4s. 3d.	3s. 9d.
Denver Gold, Colo.	1s 3d.	9d.
Dickens Custer, Idaho.	3s. 9d.	3s. 3d.
East Arevalo, Idaho	3s.	2s.
Eberhardt, Nev	....	....
El Callao, Venezuela	....	....
Elmore, Idaho	3s. 9d.	3s. 3d
Empire, Mont	9d.	3d
Garfield, Nev	5s.	4s
Jay Hawk Mont	3s. 6d.	2s 6d
Josephine, Cal	6s.	4s
Kohinoor, Colo	2s.3d.	1s. 9d.
La Luz, Mex	1s. 3d.	1s. 3d.
La Trinidad, Mex	3s. 6d.	2s. 6d.
La Valera, Mexico	1½s.	1½s.
Montana Lt., Mont	£1⅛	£1
New California, Colo	11s.	10s.
New Consolidated	1s.	6d.
New Eberhardt, Nev.	1s. 3d.	9d.
New Emma, S., Utah	2s. 9d.	2s. 3d.
New Flagstaff Utah	2s.	1s. 6d.
Newfoundland, N. F.	3s.	2s.
N Gold Hill, N. C.	1s. 3d.	9d.
New Hoover Hill, N. C.	1s. 9d.	1s. 3d.
Old Lour, Colo	£1	£⅜
Palmarejo, Mex	19s 6d.	18s. 6d
Pinos Altos, Mex	£1 3-16	£1 1-16
Pittsburg Orig, Cal	....	....
Pittsburg Cons. Nev.	3s.	2s.
Plumas Eureka, Cal	....	....
Queurada, Venezuela	....	....
Richmond Con. Nev.	1⅞s.	1⅝s.
Ruby&Dunderberg, Nev	3s 9d.	3d.
Sam Christan, N. C.	2s. 6d.	....
Sierra Buttes, Cal.	£7-16	£5-16
Sonora, Mex	1s.	6d.
Stanly, N. C	5s.	4s.
United Mexican, Mex.	9s.	7s.
U. S. Placer, Colo	5s. 6d.	4s. 6d
Viola Lt., Idaho	2s. 3d.	1s. 9d.

Paris.*

	Jan. 23.
Belmez, Spain	550.00
Callao, Venez	79 00
Callao Bis, Venez	4.00
East Oregon, Ore	43.00
Forest Hill Divide, Cal	250.00
Golden River, Cal	400.00
" " parts	65.00
Lexington, Mont.	140.00
" parts	4.25
Ouray, Colo	10.00
Rio Tinto, Spain	428.75
Tharsis, Spain	131 25

*Francs.

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS AND MINERALS.

Acid—acetic, ℔ 100 lbs. $1.75@$2.00
Muriatic, 18°, ℔ 100 lbs. 1 00@1.50
Muriatic, 20°, ℔ 100 lbs. 1.12½@1 75
Muriatic, 22° ℔ 100 lbs. 1.37½@2.00
Nitric, 36°, ℔ 100 lbs 4.00@4.25
Nitric, 42°, ℔ 100 lbs. 6.00@6.25
Oxalic, ℔ 100 lbs. .6.50@10.50
Sulphuric, 60°, ℔ 100 lbs. 80@1.25
Sulphuric, 66°, ℔ 100 lbs. 1.00@1.75

Alkali—
Refined, 48 p. c 1.50@1 55
Refined, 58°. 1.40@1.45

Alum—Lump, ℔ lb. 1¾
Ground, ℔ lb. 1¾@2
Lump ℔ ton, Liverpool £4 17 6
Sulphate of Alumina, ℔ ton. £4 10

Aqua Ammonia—18°, ℔ lb. 4¾
20°, ℔ lb. 6
22°, ℔ lb. 6@7
26°, ℔ lb. 10@11

Ammonia—Sul., ℔ 100 lbs. 3 5
Carb, per lb. 7½@8½

Arsenic—White, powdered, ℔ lb. 3¼@3½
Red. ℔ lb 5¾@6¾
White, at Plymouth, ℔ ton. £12 2 6d

Asbestos—Am., p. ton $50@$300
Italian, p. ton, c. i. f. L'pool £18@£60

Asphaltum—P. ton 13.00
Prime Cuban, ℔ lb. 4½@5½c
Hard Cuban, ℔ ton $28.00
Trinidad, refined, ℔ ton $30.00

Barytes—Sulph., Am. prime white 17@20
Sulph., foreign, floated, p. ton 19½@21.50
Sulph., off color, p. ton 11.50@14.00
Carb., lump, f.o.b. L'pool, ton £6

Bleach—Over 35 p.c., ℔ lb. 1.70@1.75

Borax—Refined, ℔ lb. 9½@9⅝
Concentrated 7¾@8⅛
Refined at Liverpool, ℔ ton £29

Brimstone—*See Sulphur.*

Bromine—℔ lb. 37@38

Chalk—℔ ton .75
Precipitated, ℔ lb. 4¾@5

China Clay—English, ℔ ton 13.50@18.00
Southern, ℔ ton 13.50

Chrome Yellow—℔ lb. 10@25

Cobalt—Oxide, ℔ lb. 2.60@2.90

Copper—Sulph. English Wks, ton £20@£21

Copperas—Common, ℔ 100 lbs. 70
Best, ℔ 100 lbs. .75@1.00
Liverpool, ℔ ton, in casks £1 15s.

Cream of Tartar—Am. 99% 22½
Powdered, 99 p c 25

Emery—Grain, ℔ lb. 4½@5
Flour, ℔ lb. 3¾@3½

Feldspar—Ground, ℔ ton 15.00

Fuller's Earth—Lump, ℔ bbl. 1.90@2.95
Powdered, ℔ lb. 1¾@2

Gypsum—Calcined, ℔ bbl. 1.25@1.50

Iodine—Resublimed 2.75

Kainit—℔ ton 10.00

Kaolin—*See China Clay.*

Lead—Red, ℔ lb. 6¾@9
White, American, in oil, ℔ lb. 6¾@7¼
White, English, ℔ lb 8½@8¾
Acetate, or sugar of, white 12@13

Lime Acetate—Amer. Brown .95@1.00
" Gray 1.75@1.87½

Litharge—Powdered, ℔ lb. 6½@6¾
English flake, ℔ lb. 9@9½

Magnesite—Greek, ℔ ton 20.00

Manganese—Crude, per unit 23@ 28
Oxide, ground, per lb 2¼@6½

Mercuric-Chloride—(*Corrosive Sublimate*) ℔ lb. 70@72

Mineral Wool—℔ lb. 2

Mica—In sheets according to size, 1st quality, ℔ lb. 25@$6 00

Ochre—Yellow, "B. F.," ℔ ton, f.o.b. mill 30.00
" "J. F. L. S.," ℔ lb. ex dock 2½

Phosphate Rock—S. Carolina, per ton f. o. b. Charleston 5.75@7.00
Ground, ex vessel New York 11.00
Canadian Apatite, lump, f. o. b. at Montreal, ℔ ton 16.00

Phosphorus—℔ lb. 70@75

Plumbago—Ceylon, ℔ lb. 4@5
American, ℔ lb. 5@7

Potassium—Cyanide, ℔ lb. 30@40
Bromide, ℔ lb. 33
Chlorate, ℔ lb. 13@10
Carb, ℔ lb. 4.70@5.54
Caustic, ℔ lb. 7¼@8
Iodide 2.65@2.70
Muriate, ℔ 100 lbs. 1.80
Nitrate, refined, ℔ lb. 6@8
Bichromate, ℔ lb 10½@11
Sulphate, ℔ 100 lbs. 2.30@2 35
Yellow Prussiate, ℔ lb. 17½@18
Red Prussiate, ℔ lb. 42@45

Pumice Stone—Select lumps, lb. 4
Original cks., ℔ lb. 1¾@2
Powdered, pure, ℔ lb. 2¼@2½

Pyrites—Non-cupreous, p. units 10d

Quartz—Ground, ℔ ton. 14.00@16.00

Rotten Stone—Powdered, ℔ lb. 3¼@3½
Lump, ℔ lb. 6@10

Salt—Liverpool, ground ℔ sack. 75@80
Turk's Island, ℔ bush 25@2

Salt Cake—℔ lb 60@62½

Saltpeter—Crude, ℔ lb. 5¼@5½
Refined, ℔ lb 6@8

Soda Ash—Carb., 48 % 100 lb. 1.45
Caustic, 48 % 1.30
Soda Caustic, 60% 2.50
" " 70% 2.27½@2.35
" " 74-6% 2.27½@2 35
Sal, English, ℔ 100 lbs. 1.00
Sal, American, ℔ 100 lbs .90
Nitrate, 100 lbs. 1.90@1.95

Strontium—Nitrate ℔ lb. 9@9½

Sulphur—Roll, ℔ lb. 1¾
Flour, ℔ lb 2
Crude Brimstone, 2s., ℔ ton. 19.50
Crude Brimstone, 3ds, ℔ ton. 19 00

Talc—Ground French, ℔ lb. 1¼@1½
Domestic, ℔ ton $18@$20
c. i. f. Liverpool, ℔ ton £4 5

Vermillion—American, ℔ lb. 61
English, ℔ lb. 82@85

Vitriol—(Blue), Ordinary, ℔ lb. 5½@5⅝
Extra, ℔ lb. 7

Zinc Oxide—Am., Dry, ℔ lb. 4½
Antwerp, Red Seal, ℔ lb. 6@6½
Paris, Red Seal, ℔ lb. 6¾@7
*Spot

THE RARER METALS.

Aluminum—(Metallic), ℔ lb. $2.@$2.50
Sheet, per lb. 2.50

Arsenic—(Metallic), per lb. .40

Barium—(Metallic), per gram $4.00

Bismuth—(Metallic), per lb. 2.75

Cadmium—(Metallic), per lb. 1.00

Calcium—(Metallic), per gram 10.00

Cerium—(Metallic), per gram 7.50

Chromium—(Metallic), per gram 1.00

Cobalt—(Metallic), per lb. 6.00

Didymium—(Metallic), per gram 9.00

Erbium—(Metallic), per gram 7.50

Gallium—(Metallic), per gram 140.00

Glucinum—(Metallic) per gram 12.00

Indium—(Metallic), per gram 9.00

Iridium—(Metallic), per oz. 7.00

Lanthanum—(Metallic), per gr. 10.00

Lithium—(Metallic), per gram 10.00

Magnesium—Per lb. 4.50

Manganese—Metallic, per lb. 1.10
Chem. pure, per oz. 10.00

Molybdenum—(Metallic), per gm .50

Niobium—(Metallic), per gram 5.00

Osmium—(Metallic), per oz. 65.00

Palladium—(Metallic), per oz. 35.00

Platinum—(Metallic), per oz. 9.00

Potassium—Metallic, per lb. 28.00

Rhodium—(Metalhc), per gram, 5.00

Ruthenium—(metallic), per gm. 5.50

Rubidium—(Metallic), per gram 2.00

Selenium—(Metallic), per oz. 1.80

Sodium—(Metallic) per lb. 2.50

Strontium—(Metallic), per gm. .60

Tantallum—(Metallic) per gram 9.00

Telurium—(Metallic) per lb. 5.00

Thallium—(Metallic) per gram .25

Titanium—(Metallic) per gram. 2.25

Thorium—(Metallic) per gram. 17.00

Tungsten—(Metallic) per oz. 2.25

Uranium—(Metallic), per lb. 5.00

Vanadium—(Metallic), per gm. 22.00

Yttrium—(Metallic), per gram. 9.00

Zirconium—(Metallic), per oz. 65.00

BUILDING MATERIAL.

Bricks—Pale, ℔ 1,000 3 25@3 50
Jerseys, ℔ 1,000 5.50@6 50
Up Rivers, ℔ 1000 6 00@6.50
Haverstraw seconds, ℔ 1000. 6.25@6 50
Haverstraw firsts ℔ 1,000. 6.50@7.00
Fronts, nominal, ℔ 1000,
Croton 14.00@16.00
Wilmington 20.00@21.00
Philadelphia @22.00
Trenton @22.00
Baltimore

Building Stone—Amherst free-stone, ℔ cu. ft. 95@1.00
Brownstone, ℔ cu. ft. 1.00@1.35
Granite, rough, ℔ cu.ft. 45@1.25
Granite, Scotch ℔ cu ft. 1.00@1.10

Cement—Rosendale, ℔ bbl .85@1.10
Portland, American, ℔ bbl. 2 15@2 45
Portland, foreign, ℔ bbl. 2 30@2.40
Portland, " special brands. 2.45@2.75
Roman, ℔ bbl. 2.65@2.85
Keene's coarse, ℔ bbl. 4 50@5.50
Keene's fine, ℔ obl. 7.00@8.25

Slate—Purple and green roofing ℔ 100 ft. 7.00@7.50
Red roofing, ℔ 100 sq. ft. 12.00
Black, roofing, ℔ 100 sq. ft. 4.25@5..0

Lime—Rockland, common ℔ bbl. 1 00
Rockland, finishing, ℔ bbl. 1.20
St. John, com. and finish, ℔ bbl. .90@.95
Glens Falls, com. and fin., ℔ bbl .85@1.10

Labor—Ordinary, ℔ day 1.50@2.00
Masons, ℔ day 4.00
Plasterers, ℔ day 4.00
Carpenters, ℔ day 3.50
Plumbers, ℔ day 3.50
Painters, ℔ day 2.50@3,50
Stonesetters, ℔ day 3.5 @4 00
Tilelayers, ℔ day 3.50@4.50
Bricklayers, ℔ day 4.00